

**Clouds and the Earth's Radiant Energy System  
(CERES)**

**Data Management System**

**CERES Cloud Retrieval and Convolution  
Subsystems 4.1 through 4.4**

**Release 5 Test Plan  
Version 1**

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## Document Revision Record

The Document Revision Record contains information pertaining to approved document changes. The table lists the date the Software Configuration Change Request (SCCR) was approved, the Release and Version Number, the SCCR number, a short description of the revision, and the revised sections. The document authors are listed on the cover. The Head of the CERES Data Management Team approves or disapproves the requested changes based on recommendations of the Configuration Control Board.

### Document Revision Record

| SCCR Approval Date | Release/Version Number | SCCR Number | Description of Revision  | Section(s) Affected                                       |
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| 05/24/01           | R3V4                   | 262         | <ul style="list-style-type: none"> <li>Added new subdirectory under the data Subdirectory chart in Appendix B.</li> <li>Updated Table C.6-1.</li> <li>Added instructions for copying the Instrument and MOA input files for the Cloud test cases to the instrument and sarb directories.</li> <li>Updated the test summaries to accurately reflect run time for each test case.</li> <li>For each test case, added reference to the text file which lists the expected output for each PGE.</li> <li>Updated format to comply with standards.</li> </ul> | Appendix B<br><br>Appendix C<br>All<br><br>All<br><br>All |
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## Document Revision Record

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## 1.0 Introduction

The Clouds and the Earth's Radiant Energy System (CERES) is a key component of the Earth Observing System (EOS). The CERES instrument provides radiometric measurements of the Earth's atmosphere from three broadband channels: a shortwave channel (0.3 - 5  $\mu\text{m}$ ), a total channel (0.3 - 200  $\mu\text{m}$ ), and an infrared window channel (8 - 12  $\mu\text{m}$ ). The CERES instruments are improved models of the Earth Radiation Budget Experiment (ERBE) scanner instruments, which operated from 1984 through 1990 on the National Aeronautics and Space Administration's (NASA) Earth Radiation Budget Satellite (ERBS) and on the National Oceanic and Atmospheric Administration's (NOAA) operational weather satellites NOAA-9 and NOAA-10. The strategy of flying instruments on Sun-synchronous, polar orbiting satellites, such as NOAA-9 and NOAA-10, simultaneously with instruments on satellites that have precessing orbits in lower inclinations, such as ERBS, was successfully developed in ERBE to reduce time sampling errors. CERES continues that strategy by flying instruments on the polar orbiting EOS platforms simultaneously with an instrument on the Tropical Rainfall Measuring Mission (TRMM) spacecraft, which has an orbital inclination of 35 degrees. In addition, to reduce the uncertainty in data interpretation and to improve the consistency between the cloud parameters and the radiation fields, CERES includes cloud imager data and other atmospheric parameters. The TRMM satellite carries one CERES instrument while the EOS satellites carry two CERES instruments, one operating in a fixed azimuth scanning mode and the other operating in a rotating azimuth scanning mode.

## 1.1 Document Overview

This document, CERES Cloud Retrieval and Convolution Subsystems 4.1 through 4.4 Release 4 Test Plan, is part of the CERES Subsystems 4.1 through 4.4 Release 4 delivery package provided to the Atmospheric Sciences Data Center (ASDC). It provides a description of the CERES Cloud Retrieval (4.1-4.3) and Convolution of Imager Cloud Properties with CERES Footprint Point Spread Function Subsystem (4.4) Release 4 software; supporting data files; and explains the procedures for installing, executing, and testing the software. A section is also included on validating the software results. A description of acronyms and abbreviations is provided in [Appendix A](#), a directory structure diagram is contained in [Appendix B](#), a description of the software and data files is contained in [Appendix C](#), and an evaluation of the comparison software output is contained in [Appendix D](#).

This document is organized as follows:

- Section [1.0](#) - Introduction
- Section [2.0](#) - Software and Data File Installation Procedures
- Section [3.0](#) - Test and Evaluation Procedures - CER4.1-4.0P1 - Snow and Ice Processor
- Section [4.0](#) - Test and Evaluation Procedures - CER4.1-4.0P2 - Snow and Ice Processor
- Section [5.0](#) - Test and Evaluation Procedures - CER4.1-4.1P1 - TRMM Main Processor
- Section [6.0](#) - Test and Evaluation Procedures - CER4.1-4.1P2 - Terra Main Processor
- Section [7.0](#) - Test and Evaluation Procedures - CER4.1-4.1P3 - Aqua Main Processor
- Section [8.0](#) - Test and Evaluation Procedures - CER4.1-4.1P4 - Terra Collection 005 Main Processor

Section 9.0 - Test and Evaluation Procedures - CER4.1-4.1P5 - Aqua Collection 005 Main Processor

Section 10.0 - Test and Evaluation Procedures - CER4.1-4.1P6 - Aqua Collection 005 Main Processor

Section 11.0 - Test and Evaluation Procedures - CER4.1-4.2P1 - Daily QC Processor

Section 12.0 - Test and Evaluation Procedures - CER4.1-4.2P2 - Daily CRH Processor

Section 13.0 - Test and Evaluation Procedures - CER4.1-4.2P3 - Collection 005 Daily QC Processor

Section 14.0 - Test and Evaluation Procedures - CER4.1-4.2P4 - Daily QC Processor

Section 15.0 - Test and Evaluation Procedures - CER4.1-4.2P5 - Daily CRH Processor

Section 16.0 - Test and Evaluation Procedures - CER4.1-4.3P1 - Monthly QC Processor

Section 17.0 - Test and Evaluation Procedures - CER4.1-4.3P2 - Collection 005 Monthly QC Processor

Section 18.0 - Test and Evaluation Procedures - CER4.1-4.3P3 - Monthly QC Processor

Appendix A - Acronyms and Abbreviations

Appendix B - Directory Structure Diagram

Appendix C - File Description Tables

Appendix D - Evaluation of Comparison Software Output

## 1.1 Subsystem Overview

### 1.1.1 CER4.1-4.0P1 - Snow and Ice Processor

The Snow and Ice Preprocessor reads available NSIDC and NESDIS Snow and Ice data sets for a given day and reprojects the data onto a 10-minute grid for use in Clouds Processing.

The primary input data set for the Snow and Ice Processor is the National Snow and Ice Data Center's Snow and Ice Map and National Environmental Satellite, Data & Information Services' Snow and Ice Maps. The primary output consists of individual 10-minute snow and ice maps.

### 1.1.2 CER4.1-4.0P2 - Snow and Ice Processor

The Snow and Ice Preprocessor reads available NSIDC and NESDIS Snow and Ice data sets for a given day and reprojects the data onto a 10-minute grid for use in Clouds Processing.

The primary input data set for the Snow and Ice Processor is the National Snow and Ice Data Center's Snow and Ice Map and National Environmental Satellite, Data & Information Services' Snow and Ice Maps. The primary output consists of individual 10-minute snow and ice maps.

### 1.1.3 CER4.1-4.1P1 - TRMM Main Processor

CER4.1-4.1P1 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

#### **1.1.4 CER4.1-4.1P2 - Terra Main Processor**

CER4.1-4.1P2 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.
5. MODIS Aerosol Properties (MOD04): The MOD04 data product contains aerosol properties over both land and ocean determined from MODIS specific algorithms.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative

properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

### **1.1.5 CER4.1-4.1P3 - Aqua Main Processor**

CER4.1-4.1P3 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in

Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

#### **1.1.6 CER4.1-4.1P4 - Terra Main Processor**

CER4.1-4.1P4 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.



The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.
5. MODIS Aerosol Properties (MOD04): The MOD04 data product contains aerosol properties over both land and ocean determined from MODIS specific algorithms.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation

budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

### 1.1.7 CER4.1-4.1P5 - Aqua Main Processor

CER4.1-4.1P5 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

### 1.1.8 CER4.1-4.1P6 - Main Processor

CER4.1-4.1P6 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contains processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

**1.1.9 CER4.1-4.2P1 - Daily QC Processor**

The Daily QC processor reads all available gridded and binned QC files for a given day and generates the respective daily averaged QC files.

The primary input data sets for the PGE are:

EQCHG: Contains gridded quality control information in a binary format for an hour.

EQCHB: Contains binned quality control information in a binary format for an hour.

The output science products are a new clear-sky reflectance map for the next day, a daily gridded quality control report, and a daily binned quality control report.

**1.1.10 CER4.1-4.2P2 - Daily CRH Processor**

The Daily CRH processor reads all available CRH\_Update files for a given day and generates an updated CRH file for the next day's processing.

The primary input data sets for the PGE are:

ECRHU: Contains CRH values for all clear pixels in an hour.

The output science products are a new clear-sky reflectance map for the next day.

**1.1.11 CER4.1-4.2P3 - Daily QC Processor**

The Daily QC processor reads all available gridded and binned QC files for a given day and generates the respective daily averaged QC files.

The primary input data sets for the PGE are:

EQCHG: Contains gridded quality control information in a binary format for an hour.

EQCHB: Contains binned quality control information in a binary format for an hour.

The output science products are a new clear-sky reflectance map for the next day, a daily gridded quality control report, and a daily binned quality control report.

**1.1.12 CER4.1-4.2P4 - Daily QC Processor**

The Daily QC processor reads all available gridded and binned QC files for a given day and generates the respective daily averaged QC files.

The primary input data sets for the PGE are:

EQCHG: Contains gridded quality control information in a binary format for an hour.

EQCHB: Contains binned quality control information in a binary format for an hour.

The output science products are a new clear-sky reflectance map for the next day, a daily gridded quality control report, and a daily binned quality control report.

**1.1.13 CER4.1-4.2P5 - Daily CRH Processor**

The Daily CRH processor reads all available CRH\_Update files for a given day and generates an updated CRH file for the next day's processing.

The primary input data sets for the PGE are:

ECRHU: Contains CRH values for all clear pixels in an hour.

The output science products are a new clear-sky reflectance map for the next day.

**1.1.14 CER4.1-4.3P1 - Monthly QC Processor**

The Monthly QC Processor reads all available binned and gridded QC for a given day and generates the respective monthly averaged QC files.

The primary input data sets for the Monthly QC Processor are:

EQCDG: The daily gridded QC file produced by CER4.1-4.2P1.

EQCDB: The daily binned QC file produced by CER4.1-4.2P1.

Note: A file listing of expected output for each PGE can be found in the following directory:

**\$CERESHOME/clouds/data/out\_comp/**

**1.1.15 CER4.1-4.3P2 - Monthly QC Processor**

The Monthly QC Processor reads all available binned and gridded QC for a given day and generates the respective monthly averaged QC files.

The primary input data sets for the Monthly QC Processor are:

EQCDG: The daily gridded QC file produced by CER4.1-4.2P3.

EQCDB: The daily binned QC file produced by CER4.1-4.2P3.

Note: A file listing of expected output for each PGE can be found in the following directory:

**\$CERESHOME/clouds/data/out\_comp/**

**1.1.16 CER4.1-4.3P3 - Monthly QC Processor**

The Monthly QC Processor reads all available binned and gridded QC for a given day and generates the respective monthly averaged QC files.

The primary input data sets for the Monthly QC Processor are:

EQCDG: The daily gridded QC file produced by CER4.1-4.2P4.

EQCDB: The daily binned QC file produced by CER4.1-4.2P4.

Note: A file listing of expected output for each PGE can be found in the following directory:

**\$CERESHOME/clouds/data/out\_comp/**



## 2.0 Software and Data File Installation Procedures

This section describes how to install the Subsystems 4.1 through 4.4 Cloud Retrieval and Convolution software in preparation for making the necessary test runs at the Langley Atmospheric Sciences Data Center (ASDC). The installation procedures include instructions for uncompressing and untarring the delivered tar files, properly defining environmental variables, and compiling the Cloud Retrieval and Convolution programs.

### 2.1 Installation

Software/Data File Install Procedure:

1. All Software Installation and Test Procedures **must** be run from a t-shell (tcsh). Running otherwise could potentially produce bizarre results.
2. The scripts, makefiles, and Process Control Files in the Subsystems 4.1 through 4.4 delivery package expect the CERES environment variable, **\$CERESENV**, to point to a file which sets the following environment variables:

|                  |   |  |
|------------------|---|--|
| <b>PGSDIR</b>    | - | <b>Directory for Toolkit libraries</b>                                 |
| <b>F90</b>       | - | <b>Pointer to the SGI F90 64 bit compiler</b>                          |
| <b>CERESHOME</b> | - | <b>Top Directory for CERES Software</b>                                |
| <b>PGSMMSG</b>   | - | <b>Directory which contains Toolkit and CERES Status Message Files</b> |
| <b>PGSLIB</b>    | - | <b>Directory which contains SGI 64-bit Toolkit library file</b>        |
| <b>F90COMP</b>   | - | <b>SGI F90 compiler options</b>  |
| <b>FCOMP</b>     | - | <b>SGI F90 compiler options for f77</b>                                |
| <b>CFLAGS</b>    | - | <b>SGI C compiler options</b>  |
| <b>PGSINC</b>    | - | <b>Pointer to the PGS include file directory</b>                       |
| <b>HDFDIR</b>    | - | <b>Pointer to the HDF home directory</b>                               |
| <b>HDFINC</b>    | - | <b>Pointer to the HDF include files</b>                                |
| <b>HDFEOSDIR</b> | - | <b>Pointer to the HDFEOS Directory</b>                                 |
| <b>HDFEOSLIB</b> | - | <b>Pointer to the HDFEOS Library</b>                                   |

Failing definition of **\$CERESENV**, subsystem analysts source `/CERES/lib/sgi_lib/ceres-env.csh` on *thunder/lightning* or `/ENG/CERES/lib/ceres-env.csh` on *warlock* in their login scripts.

3. Change directory to the directory where you plan to install the Cloud Retrieval and Convolution Subsystems. (The following instructions assume that the directory will be **\$CERESHOME**.)

**cd \$CERESHOME**

4. Uncompress and untar all delivered tar files.

The uncompressed files take up almost 4 Gbytes of disk space. Please allow for sufficient space to accommodate them. Certain input files are output from other Subsystems (SS1 and SS12). These include the IES, MOA, and attitude and ephemeris files. For convenience, these files were placed in the appropriate

instrument and sarb directories and included in the tar files from those directories. You must have write permission to the instrument and sarb partitions when untarring the files.

## 2.2 Compilation

The instruction for compiling the snow and ice processor software for PGE CER4.1-4.0P1 are shown in Section 2.2.1, the instructions for compiling the clouds main processor software for PGE CER4.1-4.1Px are shown in Section 2.2.2, the instructions for compiling the daily QC processor software are shown in Section 2.2.4, the instructions for compiling the daily CRH processor software are shown in Section 2.2.6, and the instructions for compiling the monthly QC processor software are shown in Section 2.2.8. The compilation scripts will independently compile the PGE indicated as a calling parameter.

It will be necessary to execute the smfcompile utility on the files **CERES\_25450.t**, **CERES\_25460.t** and **FOOTPRINT\_25500.t**:

```
cd $CERESHOME/clouds/smf
$CERESLIB/bin/smfcompile_all.csh
```

To create the required Product Generation System (PGS) include and message files for Subsystems 4.1 - 4.4.

### 2.2.1 Compiling PGE CER4.1-4.0P1

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/src
source $CERESHOME/clouds/bin/CER4.1-4.env 2
$CERESHOME/clouds/src/makeall CER4.1-4.0P1
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

### 2.2.2 Compiling PGE CER4.1-4.0P2

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```

cd $CERESHOME/clouds/CER4.1-4.0P2/src
source $CERESHOME/clouds/ CER4.1-4.0P2/rcf/CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P5/lib/makeall
$CERESHOME/clouds/CER4.1-4.0P2/src/makeall

```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```

*****
* Compilation Successful *
*****

```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.0P2/bin** directory:

**Exe.CER4.1-4.0P2.SnowIce**

### **2.2.3 Compiling PGE CER4.1-4.1P1, CER4.1-4.1P2, CER4.1-4.1P3**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands for the appropriate PGE:

For TRMM processing, CER4.1-4.1P1, execute the following commands:

```

cd $CERESHOME/clouds/src
source $CERESHOME/clouds/bin/CER4.1-4.env 2
$CERESHOME/clouds/src/makeall libraries
$CERESHOME/clouds/src/makeall CER4.1-4.1P1

```

For Terra processing, CER4.1-4.1P2, execute the following commands:

```

cd $CERESHOME/clouds/src
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/src/makeall libraries
$CERESHOME/clouds/src/makeall CER4.1-4.1P2

```

For Aqua processing, CER4.1-4.1P3, execute the following commands:

```

cd $CERESHOME/clouds/src
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/src/makeall libraries
$CERESHOME/clouds/src/makeall CER4.1-4.1P3

```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

#### **2.2.4 Compiling PGE CER4.1-4.1P4, CER4.1-4.1P5**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands for the appropriate PGE:

For Terra Collection 005 processing, CER4.1-4.1P4, execute the following commands:

```
cd $CERESHOME/clouds/CER4.1-4.1P4/src
source $CERESHOME/clouds/CER4.1-4.1P4/rcf/CER4.1-4.env 3
$CERESHOME/clouds/CER4.1-4.1P4/lib/makeall
$CERESHOME/clouds/CER4.1-4.1P4/src/makeall
```

The following executables should be created in the \$CERESHOME/clouds/CER4.1-4.1P4/bin directory:

```
Exe.CER4.1-4.1P4.footprint
Exe.CER4.1-4.1P4.retrieval
```

For Aqua Collection 005 processing, CER4.1-4.1P5, execute the following commands:

```
cd $CERESHOME/clouds/CER4.1-4.1P5/src
source $CERESHOME/clouds/CER4.1-4.1P5/rcf/CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P5/lib/makeall
$CERESHOME/clouds/CER4.1-4.1P5/src/makeall
```

The following executables should be created in the \$CERESHOME/clouds/CER4.1-4.1P5/bin directory:

```
Exe.CER4.1-4.1P5.footprint
Exe.CER4.1-4.1P5.retrieval
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

### 2.2.5 Compiling PGE CER4.1-4.1P6

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands for the appropriate PGE:

```
cd $CERESHOME/clouds/src
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 lib_CER4.1-4.1P6
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 CER4.1-4.1P6
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the \$CERESHOME/clouds/bin directory:

```
Exe.CER4.1-4.1P6.footprint
Exe.CER4.1-4.1P6.retrieval
```

### 2.2.6 Compiling PGE CER4.1-4.2P1

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/src
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/src/makeall CER4.1-4.2P1
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

### 2.2.7 Compiling PGE CER4.1-4.2P2

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.2P2/src
source $CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P5/lib/makeall
$CERESHOME/clouds/CER4.1-4.2P2/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the \$CERESHOME/clouds/CER4.1-4.2P2/bin directory:

```
Exe.CER4.1-4.2P2.UpdateCRH0063
Exe.CER4.1-4.2P2.UpdateCRH0160
Exe.CER4.1-4.2P2.UpdateCRH0213
```

### 2.2.8 Compiling PGE CER4.1-4.2P3

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.2P3/src
source $CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P5/lib/makeall
$CERESHOME/clouds/CER4.1-4.2P3/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.2P3/bin** directory:

**Exe.CER4.1-4.2P3.DailyBinned**  
**Exe.CER4.1-4.2P3.ReadQC**  
**Exe.CER4.1-4.2P3.UpdateQC**

## **2.2.9 Compiling PGE CER4.1-4.2P4**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

If libraries have not been compiled under the Compiling PGE CER4.1-4.1P6 section, execute the following sequence of commands:

**cd \$CERESHOME/clouds/src**  
**\$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 lib\_CER4.1-4.1P6**

For Compiling PGE CER4.1-4.2P4:

**cd \$CERESHOME/clouds/src**  
**\$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 CER4.1-4.2P4**

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/bin** directory:

**Exe.CER4.1-4.2P4.DailyBinned**  
**Exe.CER4.1-4.2P4.ReadQC**  
**Exe.CER4.1-4.2P4.UpdateQC**

## **2.2.10 Compiling PGE CER4.1-4.2P5**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

If libraries have not been compiled under the Compiling PGE CER4.1-4.1P6 section, execute the following sequence of commands:

```
cd $CERESHOME/clouds/src  
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 lib_CER4.1-4.1P6
```

For Compiling PGE CER4.1-4.2P5:

```
cd $CERESHOME/clouds/src  
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 CER4.1-4.2P5
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****  
* Compilation Successful *  
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/bin** directory:

```
Exe.CER4.1-4.2P5.UpdateCRH0063  
Exe.CER4.1-4.2P5.UpdateCRH0160  
Exe.CER4.1-4.2P5.UpdateCRH0213
```

## **2.2.11 Compiling PGE CER4.1-4.3P1**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/src  
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/src/makeall CER4.1-4.3P1
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****  
* Compilation Successful *  
*****
```

Anything else indicates failure.



### 2.2.12 Compiling PGE CER4.1-4.3P2

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.3P2/src
source $CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P5/lib/makeall
$CERESHOME/clouds/CER4.1-4.3P2/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the \$CERESHOME/clouds/CER4.1-4.3P2/bin directory:

**Exe.CER4.1-4.3P2.ProduceMonthlyQC**

### 2.2.13 Compiling PGE CER4.1-4.3P3

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory \$CERESHOME/clouds/src. To run the make script, execute the following sequence of commands:

If libraries have not been compiled under the Compiling PGE CER4.1-4.1P6 section, execute the following sequence of commands:

```
cd $CERESHOME/clouds/src
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 lib_CER4.1-4.1P6
```

For Compiling PGE CER4.1-4.3P3:

```
cd $CERESHOME/clouds/src
$CERESHOME/clouds/src/makeall.Ed3.1P6.2P4.2P5.3P3 CER4.1-4.3P3
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****  
* Compilation Successful *  
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/bin** directory:

**Exe.CER4.1-4.3P3.ProduceMonthlyQC**

### 3.0 Test and Evaluation Procedures - CER4.1-4.0P1 Snow and Ice Processor

This section provides information on how to execute PGE CER4.1-4.0P1. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

#### 3.1 Stand Alone Test Procedures

##### 3.1.1 Execution

###### 3.1.1.1 NSIDC Snow and Ice Data

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3  
$CERESHOME/clouds/bin/CER4.1-4.0P1.PCFGGen 2001 06 14  
$CERESHOME/clouds/bin/Run.CER4.1-4.0P1 $CERESHOME/clouds/rcf/CER4.1-  
4.0P1_PCF_CERES_NSIDCNESDIS_000000.20010614
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

##### 3.1.2 Exit Codes

All CER4.1-4.0P1 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

##### 3.1.3 Snow and Ice Processor Test Summary

| <b>PGE Number</b> | <b>PGE Name</b>        | <b>Run Time (mm:ss)</b> | <b>Disk Storage (MB)</b> | <b>Memory (MB)</b> |
|-------------------|------------------------|-------------------------|--------------------------|--------------------|
| CER4.1-4.0P1      | Snow and Ice Processor | 00:03                   | 05                       | 65                 |

#### 3.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 3.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 3.2.3.

### 3.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 3.2.3.

### 3.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.0P1
```

### 3.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 3.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup
$CERESHOME/clouds/rcf/CER4.1-
4.0P1_PCF_CERES_NSIDCNESDIS_000000.20010614
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves

readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 4.0 Test and Evaluation Procedures - CER4.1-4.0P2 Snow and Ice Processor

This section provides information on how to execute PGE CER4.1-4.0P2. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 4.1 Stand Alone Test Procedures

#### 4.1.1 Execution

##### 4.1.1.1 NSIDC Snow and Ice Data

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

##### For 8th MESH:

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 3 1  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.0P2.PCFGen.pl 2008 06 17  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.0P2.pl  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/pcf/CER4.1-  
4.0P2_PCF_CERES_NSIDC-NESDIS_000000.20080617
```

##### For 16th MESH:

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 3 2  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.0P2.PCFGen.pl 2008 06 17  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.0P2.pl  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/pcf/CER4.1-  
4.0P2_PCF_CERES_NSIDC-NESDISMesh16th_000000.20080617
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data_exp/CER4.1-4.0P2/out_description.txt
```

#### 4.1.2 Exit Codes

All CER4.1-4.0P2 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 4.1.3 Snow and Ice Processor Test Summary

| PGE Number   | PGE Name               | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|------------------------|------------------|-------------------|-------------|
| CER4.1-4.0P2 | Snow and Ice Processor | 00:03            | 05                | 65          |

## 4.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 4.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 4.2.3.

### 4.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 4.2.3.

### 4.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For 8th MESH:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 3 1
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.0P2
```

**For 16th MESH:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 3 2
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.0P2
```

### 4.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

### 4.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For 8th MESH:**

```
source $CERESHOME/clouds/ CER4.1-4.0P2/rcf /CER4.1-4.env 3 1
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.0P2/rcf/pcf/CER4.1-
4.0P2_PCF_CERES_NSIDC-NESDIS_000000.20080617
```

**For 16th MESH:**

```
source $CERESHOME/clouds/ CER4.1-4.0P2/rcf /CER4.1-4.env 3 2
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.0P2/rcf/pcf/CER4.1-
4.0P2_PCF_CERES_NSIDC-NESDISMesh16th_000000.20080617
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.



## 5.0 Test and Evaluation Procedures - CER4.1-4.1P1 TRMM Main Processor

This section provides information on how to execute PGE CER4.1-4.1P1. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 5.1 Stand Alone Test Procedures

#### 5.1.0 VIRS Imager File Preparation (for Section 5.1.1.1)

The VIRS files, as received from TSDIS, are inappropriately named. Subsystems 4.1-4.3 need the VIRS files to be named according the following convention: CER\_ECID\_TRMM-VIRS.YYYYMMDD\_HH.XX where YYYY is a four digit year, MM is the two digit month, DD is the two digit day, HH is the two digit hour, XX is a two digit sequence. All values correspond to the time of the hour being processed. Included in this delivery are code and scripts to accomplish the renaming needed. During the Execution phase of the Test Plan, appropriate instructions will be provided to correctly rename the correct VIRS files for that particular test case.

#### 5.1.1 Execution

##### 5.1.1.1 TRMM-VIRS Processing

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

Rename the full version of the VIRS file with the following commands:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 2  
$CERESHOME/clouds/bin/Run.CER4.1-4.0P1.RenameVIRS  
$CERESHOME/clouds/data/input/VIRS/1B01.980105.612.5.HDF
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

```
source $CERESHOME/clouds/bin/CER4.1-4.env  
$CERESHOME/clouds/bin/CER4.1-4.1P1.PCFGen 1998 01 05 16  
$CERESHOME/clouds/bin/Run.CER4.1-4.1P1 $CERESHOME/clouds/rcf/CER4.1-  
4.1P1_PCF_TRMM-PFM-VIRS_SSIT_000000.1998010516
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

### 5.1.2 Exit Codes

All CER4.1-4.1P1 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 5.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|--|-----------|------------------|-------------------|-------------|
| CER4.1-4.1P1 | Cloud Property Retrieval and Convolution | TRMM      | 26:20            | 400               | 280         |

## 5.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 5.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 5.2.3.

### 5.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 5.2.3.

### 5.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 2
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.1P1
```

### 5.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 5.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before

any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For TRMM-VIRS:**

**\$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup  
\$CERESHOME/clouds/rcf/CER4.1-4.1P1\_PCF\_TRMM-PFM-  
VIRS\_SSIT\_000000.1998010516**

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## **6.0 Test and Evaluation Procedures - CER4.1-4.1P2 Terra Main Processor**

This section provides information on how to execute PGE CER4.1-4.1P2. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### **6.1 Stand Alone Test Procedures**

#### **6.1.0 MODIS Imager File Preparation (for Section 6.1.1.1)**

#### **6.1.1 Execution**

##### **6.1.1.1 Terra-MODIS Processing**

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
```

```
$CERESHOME/clouds/bin/CER4.1-4.1P2.PCFGGen 2000 06 15 23
```

```
$CERESHOME/clouds/bin/Run.CER4.1-4.1P2 $CERESHOME/clouds/rcf/CER4.1-4.1P2_PCF_Terra-FM1+FM2-MODIS_SSIT_000000.2000061523
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

There are 16 possible granules for each of three different MODIS file types, radiance, geolocation, and aerosol. The file names includes the creation time which there is no way of knowing for every file. An ls is done in the PCFGen script using the portion of the name we know. When a file is not found, the operating system returns "ls:No match". This is not necessarily an error if MODIS files are missing. Problems will be identified during execution if a matched MODIS data set is not available.

#### **6.1.2 Exit Codes**

All CER4.1-4.1P2 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 6.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|--|-----------|------------------|-------------------|-------------|
| CER4.1-4.1P2 | Cloud Property Retrieval and Convolution | Terra     | 17:27            | 100               | 454         |

## 6.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 6.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 6.2.3.

### 6.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 6.2.3.

### 6.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.1P2
```

### 6.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 6.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport

and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS:**

**\$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup**

**\$CERESHOME/clouds/rcf/CER4.1-4.1P2\_PCF\_Terra-FM1+FM2-  
MODIS\_SSIT\_000000.2000061523**

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 7.0 Test and Evaluation Procedures - CER4.1-4.1P3 Aqua Main Processor

This section provides information on how to execute PGE CER4.1-4.1P3. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 7.1 Stand Alone Test Procedures

#### 7.1.0 MODIS Imager File Preparation (for Section 7.1.1.1)

#### 7.1.1 Execution

##### 7.1.1.1 Aqua-MODIS Processing

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6
```

```
$CERESHOME/clouds/bin/CER4.1-4.1P3.PCFGGen 2003 07 01 17
```

```
$CERESHOME/clouds/bin/Run.CER4.1-4.1P3 $CERESHOME/clouds/rcf/CER4.1-4.1P3_PCF_Aqua-FM3+FM4-MODIS_SSIT_000000.2003070117
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

#### 7.1.2 Exit Codes

All CER4.1-4.1P3 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 7.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|--|-----------|------------------|-------------------|-------------|
| CER4.1-4.1P3 | Cloud Property Retrieval and Convolution | Aqua      | 39:52            | 100               | 454         |

## 7.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### **7.2.1 Log and Status File Results**

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 7.2.3.

### **7.2.2 Metadata Evaluation**

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 7.2.3.

### **7.2.3 Execution of Comparison Software**

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.1P3
```

### **7.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

## **7.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Aqua-MODIS:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup  
$CERESHOME/clouds/rcf/CER4.1-4.1P3_PCF_Aqua-FM3+FM4-  
MODIS_SSIT_000000.2003070117
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.



2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## **8.0 Test and Evaluation Procedures - CER4.1-4.1P4 Terra Collection 005 Main Processor**

This section provides information on how to execute PGE CER4.1-4.1P4. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### **8.1 Stand Alone Test Procedures**

#### **8.1.0 MODIS Imager File Preparation (for Section 8.1.1.1)**

##### **8.1.1 Execution**

###### **8.1.1.1 Terra-MODIS Processing**

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

```
source $CERESHOME/clouds/CER4.1-4.1P4/rcf/CER4.1-4.env 3  
$CERESHOME/clouds/CER4.1-4.1P4/rcf/CER4.1-4.1P4.PCFGen.pl 2006 07 15 15  
$CERESHOME/clouds/CER4.1-4.1P4/rcf/Run.CER4.1-4.1P4.pl  
$CERESHOME/clouds/CER4.1-4.1P4/rcf/pcf/CER4.1-4.1P4_PCF_Terra-  
FM1+FM2-MODIS_V005_000000.2006071515
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data_exp/CER4.1-4.1P4/out_description.txt
```

##### **8.1.2 Exit Codes**

All CER4.1-4.1P4 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 8.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|--|-----------|------------------|-------------------|-------------|
| CER4.1-4.1P4 | Cloud Property Retrieval and Convolution | Terra     | 9:31             | 100               | 454         |

## 8.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 8.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 8.2.3.

### 8.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 8.2.3.

### 8.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

```
source $CERESHOME/clouds/CER4.1-4.1P4/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.1P4
```

### 8.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 8.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the

expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS:**

**\$CERESHOME/clouds/CER4.1-4.1P4/rcf/Run.CER4.1-4.Cleanup.pl  
\$CERESHOME/clouds/CER4.1-4.1P4/rcf/pcf/CER4.1-  
4.1P4\_PCF\_Terra-FM1+FM2-MODIS\_V005\_000000.2006071515**

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 9.0 Test and Evaluation Procedures - CER4.1-4.1P5 Aqua Collection 005

### Main Processor

This section provides information on how to execute PGE CER4.1-4.1P5. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

## 9.1 Stand Alone Test Procedures

### 9.1.0 MODIS Imager File Preparation (for Section 9.1.1.1)

#### 9.1.1 Execution

##### 9.1.1.1 Aqua-MODIS Processing

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

```
source $CERESHOME/clouds/CER4.1-4.1P5/rcf/CER4.1-4.env 6  
$CERESHOME/clouds/CER4.1-4.1P5/rcf/CER4.1-4.1P5.PCFGen.pl 2006 07 15 15  
$CERESHOME/clouds/CER4.1-4.1P5/rcf/Run.CER4.1-4.1P5.pl  
  $CERESHOME/clouds/CER4.1-4.1P5/rcf/pcf/CER4.1-4.1P5_PCF_Aqua-  
  FM3+FM4-MODIS_V005_000000.2006071515
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data_exp/CER4.1-4.1P5/out_description.txt
```

#### 9.1.2 Exit Codes

All CER4.1-4.1P5 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 9.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|--|-----------|------------------|-------------------|-------------|
| CER4.1-4.1P5 | Cloud Property Retrieval and Convolution | Aqua      | 10:15            | 100               | 454         |

## 9.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 9.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 9.2.3.

### 9.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 9.2.3.

### 9.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

```
source $CERESHOME/clouds/CER4.1-4.1P5/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.1P5
```

### 9.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 9.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the

expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Aqua-MODIS:**

**\$CERESHOME/clouds/CER4.1-4.1P5/rcf/Run.CER4.1-4.Cleanup.pl  
\$CERESHOME/clouds/CER4.1-4.1P5/rcf/pcf/CER4.1-4.1P5\_PCF\_Aqua-  
FM3+FM4-MODIS\_V005\_000000.2006071515**

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 10.0 Test and Evaluation Procedures - CER4.1-4.1P6 Aqua and Terra Main Processor

This section provides information on how to execute PGE CER4.1-4.1P6. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 10.1 Stand Alone Test Procedures

#### 10.1.0 MODIS Imager File Preparation (for Section 10.1.1.1)

##### 10.1.1 Execution

###### 10.1.1.1 Aqua-MODIS and Terra-MODIS Processing

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

**For Terra:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3  
    $CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Terra-FM1+FM2-  
    MODIS_SSIT_000000.2006071517  
  
$CERESHOME/clouds/bin/CER4.1-4.1P6.PCFGen.pl 3 2006 07 15 17  
$CERESHOME/clouds/bin/Run.CER4.1-4.1P6.pl  
    $CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Terra-FM1+FM2-  
    MODIS_SSIT_000000.2006071517
```

**For Aqua:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6  
    $CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Aqua-FM3+FM4-  
    MODIS_SSIT_000000.2006071519  
  
$CERESHOME/clouds/bin/CER4.1-4.1P6.PCFGen.pl 6 2006 07 15 19  
$CERESHOME/clouds/bin/Run.CER4.1-4.1P6.pl  
    $CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Aqua-FM3+FM4-  
    MODIS_SSIT_000000.2006071519
```



Note: A file listing of expected output for each PGE can be found in the following file:

**\$CERESHOME/clouds/data/out\_exp/out\_description.txt**

### 10.1.2 Exit Codes

All CER4.1-4.1P6 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 10.1.3 Main Processor Test Summary

| PGE Number   | PGE Name                                 | Test Case  | Run Time (mm:ss) | Disk Storage (MB) | Memory (GB) |
|--------------|--|------------|------------------|-------------------|-------------|
| CER4.1-4.1P6 | Cloud Property Retrieval and Convolution | Terra/Aqua | 14:57            | 840               | 1.3         |

## 10.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 10.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [10.2.3](#).

### 10.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [10.2.3](#).

### 10.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. The software must be run for each of the four test cases. To run the comparison software, execute the following commands:

**For Terra:**

**source \$CERESHOME/clouds/bin/CER4.1-4.env 3**

**\$CERESHOME/clouds/test\_suites/bin/CER4.1-4.Validate CER4.1-4.1P6**

**For Aqua:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.1P6
```

**10.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

**10.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3
$CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Terra-FM1+FM2-
MODIS_SSIT_000000.2006071517
```

**For Aqua-MODIS:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6
$CERESHOME/clouds/rcf/CER4.1-4.1P6_PCF_Aqua-FM3+FM4-
MODIS_SSIT_000000.2006071519
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 11.0 Test and Evaluation Procedures - CER4.1-4.2P1 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P1. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 11.1 Stand Alone Test Procedure

#### 11.1.1 Execution

##### 11.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/CER4.1-4.2P1.PCFGGen 2003 07 01  
$CERESHOME/clouds/bin/Run.CER4.1-4.2P1 $CERESHOME/clouds/rcf/CER4.1-  
4.2P1_PCF_Aqua-MODIS_SSIT_000000.20030701
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

There are 16 possible granules for each of three different MODIS file types, radiance, geolocation, and aerosol. The file names includes the creation time which there is no way of knowing for every file. An ls is done in the PCFGen script using the portion of the name we know. When a file is not found, the operating system returns “ls:No match”. This is not necessarily an error if MODIS files are missing. Problems will be identified during execution if a matched MODIS data set is not available.

#### 11.1.2 Exit Codes

All CER4.1-4.2P1 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 11.1.3 Daily QC Processor Test Summary

| <b>PGE Number</b> | <b>PGE Name</b>    | <b>Run Time (mm:ss)</b> | <b>Disk Storage (MB)</b> | <b>Memory (MB)</b> |
|-------------------|--------------------|-------------------------|--------------------------|--------------------|
| CER4.1-4.2P1      | Daily QC Processor | 00:41                   | 200                      | 348                |

## 11.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

```
$CERESHOME/clouds/test_suites/scripts/Remove_input.csh
```

### 11.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [11.2.3](#).

### 11.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [11.2.3](#).

### 11.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.2P1
```

### 11.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 11.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup  
$CERESHOME/clouds/rcf/CER4.1-4.2P1_PCF_Aqua-  
MODIS_SSIT_000000.20030701
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 12.0 Test and Evaluation Procedures - CER4.1-4.2P2 Daily CRH Processor

This section provides information on how to execute PGE CER4.1-4.2P2. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 12.1 Stand Alone Test Procedure

#### 12.1.1 Execution

##### 12.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.env 3  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.2P2.PCFGen.pl 2006 07 15  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/Run.CER4.1-4.2P2.pl  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/pcf/CER4.1-4.2P2_PCF_Terra-  
MODIS_V005_000000.20060715
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.env 6  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.2P2.PCFGen.pl 2006 07 15  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/Run.CER4.1-4.2P2.pl  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/pcf/CER4.1-4.2P2_PCF_Aqua-  
MODIS_V005_000000.20060715
```

Note: A file listing of expected output for each PGE can be found in the following file:  
**\$CERESHOME/clouds/data\_exp/CER4.1-4.2P2/out\_description.txt**

### 12.1.2 Exit Codes

All CER4.1-4.2P2 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 12.1.3 Daily CRH Processor Test Summary

| PGE Number   | PGE Name            | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|---------------------|------------------|-------------------|-------------|
| CER4.1-4.2P2 | Daily CRH Processor | 00:41            | 200               | 348         |

## 12.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 12.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [12.2.3](#).

### 12.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [12.2.3](#).

### 12.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P2
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.2P2/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P2
```

#### 12.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

### 12.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/CER4.1-4.2P2/rcf/Run.CER4.1-4.Cleanup.pl  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/pcf/CER4.1-  
4.2P2_PCF_Terra-MODIS_V005_000000.20060715
```

**For Aqua:**

```
$CERESHOME/clouds/CER4.1-4.2P2/rcf/Run.CER4.1-4.Cleanup.pl  
$CERESHOME/clouds/CER4.1-4.2P2/rcf/pcf/CER4.1-4.2P2_PCF_Aqua-  
MODIS_V005_000000.20060715
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.



## **13.0 Test and Evaluation Procedures - CER4.1-4.2P3 Collection 005 Daily QC Processor**

This section provides information on how to execute PGE CER4.1-4.2P3. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### **13.1 Stand Alone Test Procedure**

#### **13.1.1 Execution**

##### **13.1.1.1 All Data Sources**

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.env 3  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.2P3.PCFGen.pl 2006 07 15  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/Run.CER4.1-4.2P3.pl  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/pcf/CER4.1-4.2P3_PCF_Terra-  
MODIS_V005_000000.20060715
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.env 6  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.2P3.PCFGen.pl 2006 07 15  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/Run.CER4.1-4.2P3.pl  
$CERESHOME/clouds/CER4.1-4.2P3/rcf/pcf/CER4.1-4.2P3_PCF_Aqua-  
MODIS_V005_000000.20060715
```

Note: A file listing of expected output for each PGE can be found in the following file:  
**\$CERESHOME/clouds/data\_exp/CER4.1-4.2P3/out\_description.txt**

There are 16 possible granules for each of three different MODIS file types, radiance, geolocation, and aerosol. The file names includes the creation time which there is no way of knowing for every file. An ls is done in the PCFGen script using the portion of the name we know. When a file is not found, the operating system returns “ls:No match”. This is not necessarily an error if MODIS files are missing. Problems will be identified during execution if a matched MODIS data set is not available.

### 13.1.2 Exit Codes

All CER4.1-4.2P3 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 13.1.3 Daily QC Processor Test Summary

| PGE Number   | PGE Name                          | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|-----------------------------------|------------------|-------------------|-------------|
| CER4.1-4.2P3 | Collection 005 Daily QC Processor | 00:05            | 200               | 348         |

## 13.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 13.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [13.2.3](#).

### 13.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [13.2.3](#).

### 13.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P3
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.2P3/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P3
```

**13.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

**13.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/CER4.1-4.2P3/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.2P3/rcf/pcf/CER4.1-
4.2P3_PCF_Terra-MODIS_V005_000000.20060715
```

**For Aqua:**

```
$CERESHOME/clouds/CER4.1-4.2P3/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.2P3/rcf/pcf/CER4.1-4.2P3_PCF_Aqua-
MODIS_V005_000000.20060715
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 14.0 Test and Evaluation Procedures - CER4.1-4.2P4 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P4. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 14.1 Stand Alone Test Procedure

#### 14.1.1 Execution

##### 14.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

#### For Terra:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3  
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Terra-  
MODIS_SSIT_000000.20060715  
$CERESHOME/clouds/bin/CER4.1-4.2P4.PCFGen.pl 3 2006 07 15  
$CERESHOME/clouds/bin/Run.CER4.1-4.2P4.pl  
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Terra-  
MODIS_SSIT_000000.20060715
```

#### For Aqua:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6  
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Aqua-  
MODIS_SSIT_000000.20060715  
$CERESHOME/clouds/bin/CER4.1-4.2P4.PCFGen.pl 6 2006 07 15  
$CERESHOME/clouds/bin/Run.CER4.1-4.2P4.pl  
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Aqua-  
MODIS_SSIT_000000.20060715
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

There are 16 possible granules for each of three different MODIS file types, radiance, geolocation, and aerosol. The file names includes the creation time which there is no way of knowing for every file. An ls is done in the PCFGen script using the portion of the name we know. When a file is not found, the operating system returns “ls:No match”. This is not necessarily an error if MODIS files are missing. Problems will be identified during execution if a matched MODIS data set is not available.

#### 14.1.2 Exit Codes

All CER4.1-4.2P4 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 14.1.3 Daily QC Processor Test Summary

| PGE Number   | PGE Name                          | Test Case  | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|-----------------------------------|------------|------------------|-------------------|-------------|
| CER4.1-4.2P4 | Collection 005 Daily QC Processor | Terra/Aqua | 00:05            | 200               | 973         |

### 14.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

#### 14.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [14.2.3](#).

#### 14.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [14.2.3](#).

#### 14.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.2P4
```

**For Aqua:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.2P4
```

**14.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

**14.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Terra-
MODIS_SSIT_000000.20060715
```

**For Aqua:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6
$CERESHOME/clouds/rcf/CER4.1-4.2P4_PCF_Aqua-
MODIS_SSIT_000000.20060715
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 15.0 Test and Evaluation Procedures - CER4.1-4.2P5 Daily CRH Processor

This section provides information on how to execute PGE CER4.1-4.2P5. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 15.1 Stand Alone Test Procedure

#### 15.1.1 Execution

##### 15.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

#### For Terra:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3  
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Terra-  
MODIS_SSIT_000000.20060715  
$CERESHOME/clouds/bin/CER4.1-4.2P5.PCFGen.pl 3 2006 07 15  
$CERESHOME/clouds/bin/Run.CER4.1-4.2P5.pl  
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Terra-  
MODIS_SSIT_000000.20060715
```

#### For Aqua:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6  
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Aqua-  
MODIS_SSIT_000000.20060715  
$CERESHOME/clouds/bin/CER4.1-4.2P5.PCFGen.pl 6 2006 07 15  
$CERESHOME/clouds/bin/Run.CER4.1-4.2P5.pl  
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Aqua-  
MODIS_SSIT_000000.20060715
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

### 15.1.2 Exit Codes

All CER4.1-4.2P5 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 15.1.3 Daily CRH Processor Test Summary

| PGE Number   | PGE Name            | Test Case  | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|---------------------|------------|------------------|-------------------|-------------|
| CER4.1-4.2P5 | Daily CRH Processor | Terra/Aqua | 00:41            | 200               | 348         |

## 15.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 15.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [15.2.3](#).

### 15.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [15.2.3](#).

### 15.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.2P5
```



**For Aqua:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.2P5
```

**15.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

**15.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Terra-
MODIS_SSIT_000000.20060715
```

**For Aqua:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6
$CERESHOME/clouds/rcf/CER4.1-4.2P5_PCF_Aqua-
MODIS_SSIT_000000.20060715
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 16.0 Test and Evaluation Procedures - CER4.1-4.3P1 Monthly QC Processor

This section provides information on how to execute PGE CER4.1-4.3P1. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 16.1 Stand Alone Test Procedures

#### 16.1.1 Execution

##### 16.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/CER4.1-4.3P1.PCFGGen 2003 07  
$CERESHOME/clouds/bin/Run.CER4.1-4.3P1 $CERESHOME/clouds/rcf/CER4.1-  
4.3P1_PCF_Aqua-MODIS_SSIT_000000.200307
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

#### 16.1.2 Exit Codes

All CER4.1-4.3P1 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 16.1.3 Monthly QC Processor Test Summary

| <b>PGE Number</b> | <b>PGE Name</b>      | <b>Run Time (mm:ss)</b> | <b>Disk Storage (MB)</b> | <b>Memory (MB)</b> |
|-------------------|----------------------|-------------------------|--------------------------|--------------------|
| CER4.1-4.3P1      | Monthly QC Processor | 00:02                   | 350                      | 348                |

### 16.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 16.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 16.2.3.

### 16.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 16.2.3.

### 16.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.3P1
```

### 16.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

## 16.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup  
$CERESHOME/clouds/rcf/CER4.1-4.3P1_PCF_Aqua-  
MODIS_SSIT_000000.200307
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## **17.0 Test and Evaluation Procedures - CER4.1-4.3P2 Collection 005 Monthly QC Processor**

This section provides information on how to execute PGE CER4.1-4.3P2. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### **17.1 Stand Alone Test Procedures**

#### **17.1.1 Execution**

##### **17.1.1.1 All Data Sources**

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The following command will remove default memory limits. If it is not in your .cshrc file, you will need to type the command at the command line:

```
unlimit
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.env 3  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.3P2.PCFGen.pl 2006 07  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/Run.CER4.1-4.3P2.pl  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/pcf/CER4.1-4.3P2_PCF_Terra-  
MODIS_V005_000000.200607
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.env 6  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.3P2.PCFGen.pl 2006 07  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/Run.CER4.1-4.3P2.pl  
$CERESHOME/clouds/CER4.1-4.3P2/rcf/pcf/CER4.1-4.3P2_PCF_Aqua-  
MODIS_V005_000000.200607
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data_exp/CER4.1-4.3P2/out_description.txt
```

### 17.1.2 Exit Codes

All CER4.1-4.3P2 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 17.1.3 Monthly QC Processor Test Summary

| PGE Number   | PGE Name                            | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|-------------------------------------|------------------|-------------------|-------------|
| CER4.1-4.3P2 | Collection 005 Monthly QC Processor | 00:02            | 350               | 348         |

## 17.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 17.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [17.2.3](#).

### 17.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [17.2.3](#).

### 17.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.3P2
```

**For Aqua:**

```
source $CERESHOME/clouds/CER4.1-4.3P2/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.3P2
```

**17.2.4 Evaluation of Comparison Software Output**

See [Appendix D](#) for a description of the output from the Comparison Software.

**17.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/CER4.1-4.3P2/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.3P2/rcf/pcf/CER4.1-
4.3P2_PCF_Terra-MODIS_V005_000000.200607
```

**For Aqua:**

```
$CERESHOME/clouds/CER4.1-4.3P2/rcf/Run.CER4.1-4.Cleanup.pl
$CERESHOME/clouds/CER4.1-4.3P2/rcf/pcf/CER4.1-4.3P2_PCF_Aqua-
MODIS_V005_000000.200607
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 18.0 Test and Evaluation Procedures - CER4.1-4.3P3 Monthly QC Processor

This section provides information on how to execute PGE CER4.1-4.3P3. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 18.1 Stand Alone Test Procedures

#### 18.1.1 Execution

##### 18.1.1.1 All Data Sources

The following command will copy the necessary input files for running this PGE. This command only needs to be executed if the input files have not been copied to the appropriate directories already. Copy the input files to appropriate locations using the following script:

```
$CERESHOME/clouds/test_suites/scripts/Copy_input.csh
```

The PGE can be executed with the following sequence of commands listed below. This sequence of commands covers PCF generation as well as execution of the PGE.

#### For Terra:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Terra-  
MODIS_SSIT_000000.200607  
$CERESHOME/clouds/bin/CER4.1-4.3P3.PCFGen.pl 3 2006 07  
$CERESHOME/clouds/bin/Run.CER4.1-4.3P3.pl  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Terra-  
MODIS_SSIT_000000.200607
```

#### For Aqua:

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6  
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Aqua-  
MODIS_SSIT_000000.200607  
$CERESHOME/clouds/bin/CER4.1-4.3P3.PCFGen.pl 6 2006 07  
$CERESHOME/clouds/bin/Run.CER4.1-4.3P3.pl  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Aqua-  
MODIS_SSIT_000000.200607
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data/out_exp/out_description.txt
```

### 18.1.2 Exit Codes

All CER4.1-4.3P3 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 18.1.3 Monthly QC Processor Test Summary

| PGE Number   | PGE Name             | Test Case  | Run Time (mm:ss) | Disk Storage (MB) | Memory (MB) |
|--------------|----------------------|------------|------------------|-------------------|-------------|
| CER4.1-4.3P3 | Monthly QC Processor | Terra/Aqua | 00:02            | 350               | 374         |

## 18.2 Evaluation Procedures

The Test Evaluation procedures must be run on the same day that the Test is run. If unable to run the Evaluation procedures at that time, contact the analyst for a work around.

The following will remove the Instrument and MOA input data files that were used for testing. This step is done when all testing is complete. **If you are testing another PGE, then it is not necessary to do this step.**

**\$CERESHOME/clouds/test\_suites/scripts/Remove\_input.csh**

### 18.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory \$CERESHOME/clouds/data/runlogs after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [18.2.3](#).

### 18.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [18.2.3](#).

### 18.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For Terra:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.3P3
```

**For Aqua:**

```
source $CERESHOME/clouds/bin/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate CER4.1-4.3P3
```



#### 18.2.4 Evaluation of Comparison Software Output

See [Appendix D](#) for a description of the output from the Comparison Software.

### 18.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For Terra:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 3  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Terra-  
MODIS_SSIT_000000.200607
```

**For Aqua:**

```
$CERESHOME/clouds/bin/Run.CER4.1-4.Cleanup.pl 6  
$CERESHOME/clouds/rcf/CER4.1-4.3P3_PCF_Aqua-  
MODIS_SSIT_000000.200607
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## **Appendix A**

### **Acronyms and Abbreviations**

|          |  |
|----------|--|
| ASCII    | American Standard Code Information Interchange           |
| ASDC     | Atmospheric Sciences Data Center                         |
| ATBD     | Algorithm Theoretical Basis Document                     |
| AVHRR    | Advanced Very High Resolution Radiometer                 |
| CERES    | Clouds and the Earth's Radiant Energy System             |
| CERESlib | CERES library  |
| CID      | Cloud Imager Data  |
| CRH      | Clear Radiance History                                   |
| DAAC     | Distributed Active Archive Center                        |
| DAO      | Data Assimilation Office                                 |
| EOS      | Earth Observing System                                   |
| EOS-AM   | EOS Morning Crossing Mission                             |
| EOS-PM   | EOS Afternoon Crossing Mission                           |
| ERBE     | Earth Radiation Budget Experiment                        |
| ERBS     | Earth Radiation Budget Satellite                         |
| FOV      | Field-of-View  |
| F90      | Fortran 90   |
| IES      | Instrument Earth Scans                                   |
| ISCCP    | International Satellite Land Surface Climatology Project |
| IVT      | Instrument Validation Tape                               |
| LaTIS    | Langley TRMM Information System                          |
| MCF      | Metadata Control File                                    |
| MOA      | Meteorological, Ozone, and Aerosol                       |
| MODIS    | Moderate-Resolution Imaging Spectroradiometer            |
| NASA     | National Aeronautics and Space Administration            |
| NOAA     | National Oceanic and Atmospheric Administration          |
| PCF      | Process Control File                                     |
| PGE      | Product Generation Executives                            |
| PGS      | Product Generation System                                |
| PSF      | Point Spread Function                                    |
| QC       | Quality Control  |
| SCF      | Science Computing Facility                               |
| SMF      | Status Message File                                      |
| SSAI     | Science Systems and Applications, Inc.                   |
| SSF      | Single Scanner Footprint TOA and Surface Fluxes, Clouds  |

|         |                                     |
|---------|-------------------------------------|
| SURFMAP | SURFace MAP                         |
| TOA     | Top-of-the-atmosphere               |
| TRMM    | Tropical Rainfall Measuring Mission |
| VIRS    | Visible and Infrared System         |

Appendix B  
Directory Structure Diagrams

## Directory Structure for the Cloud Retrieval and Convolution Tar File

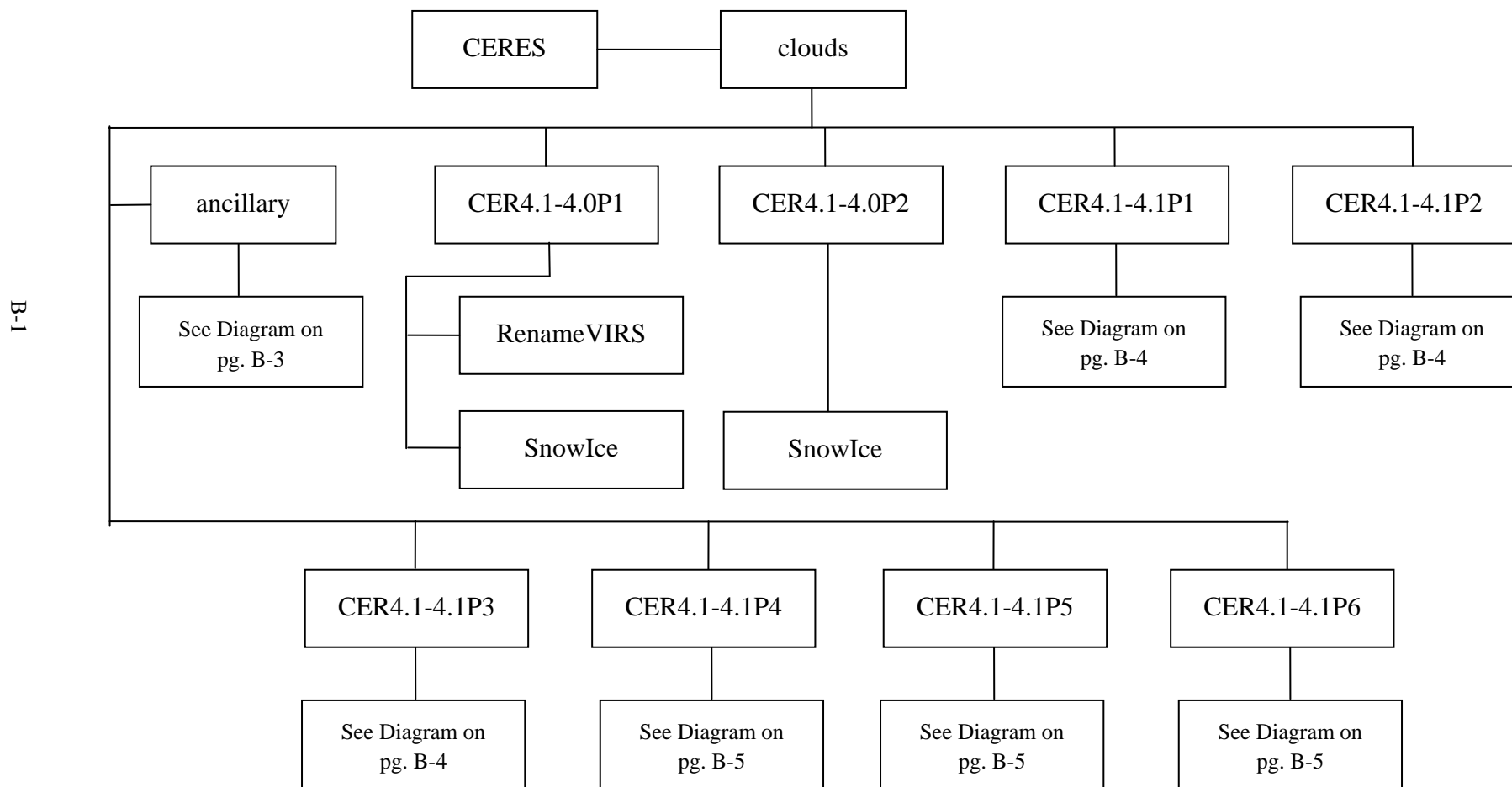


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

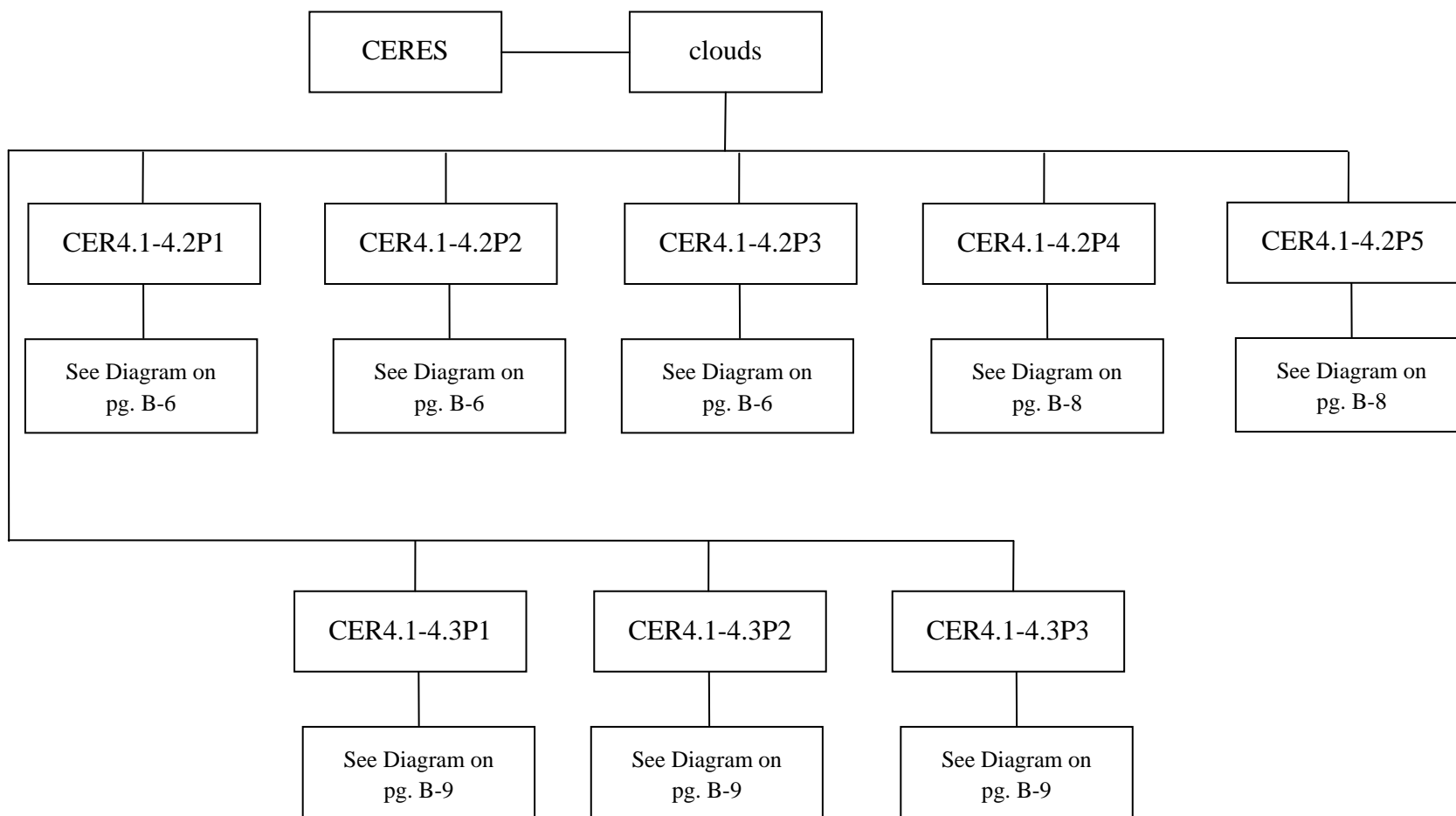


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

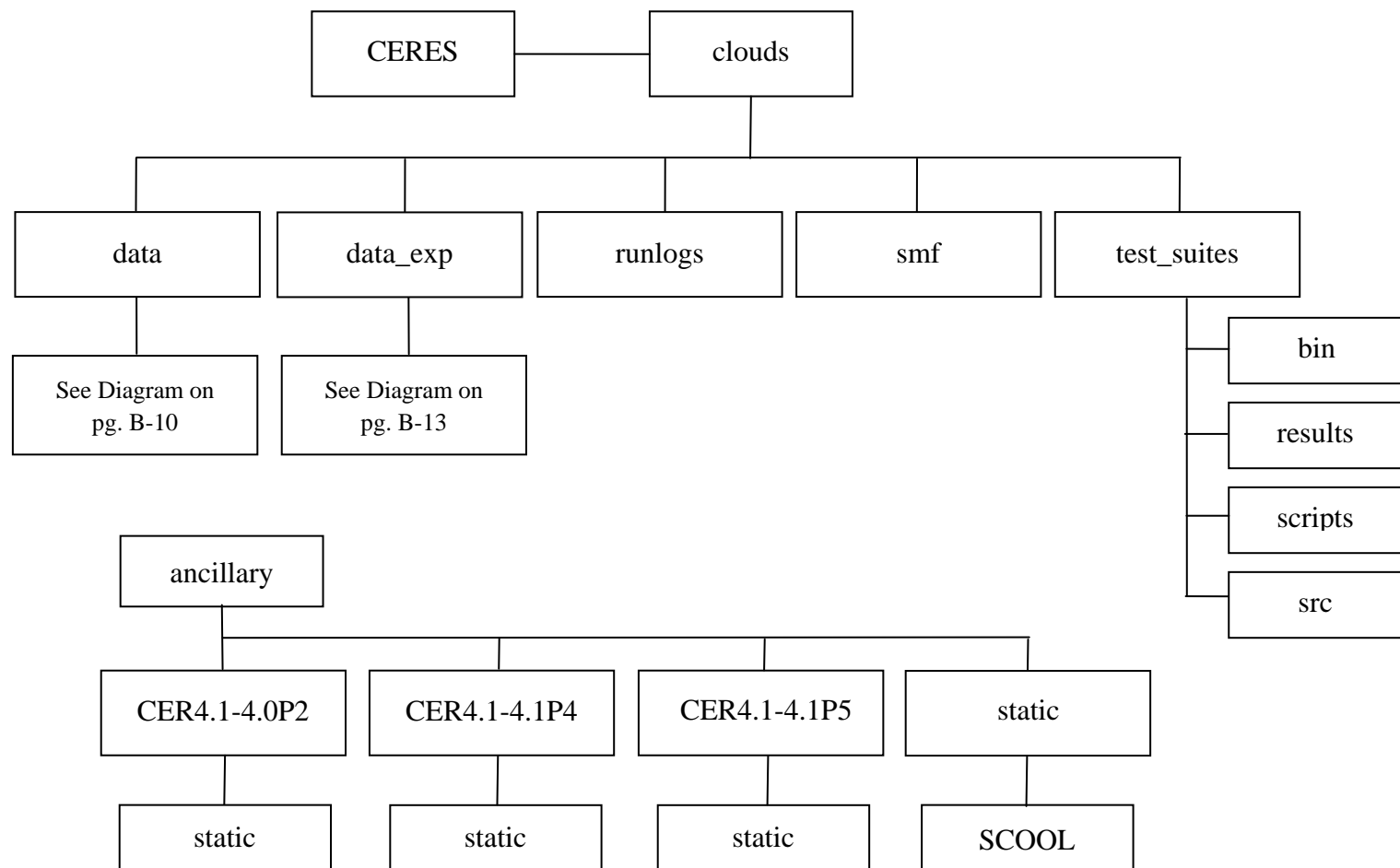


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

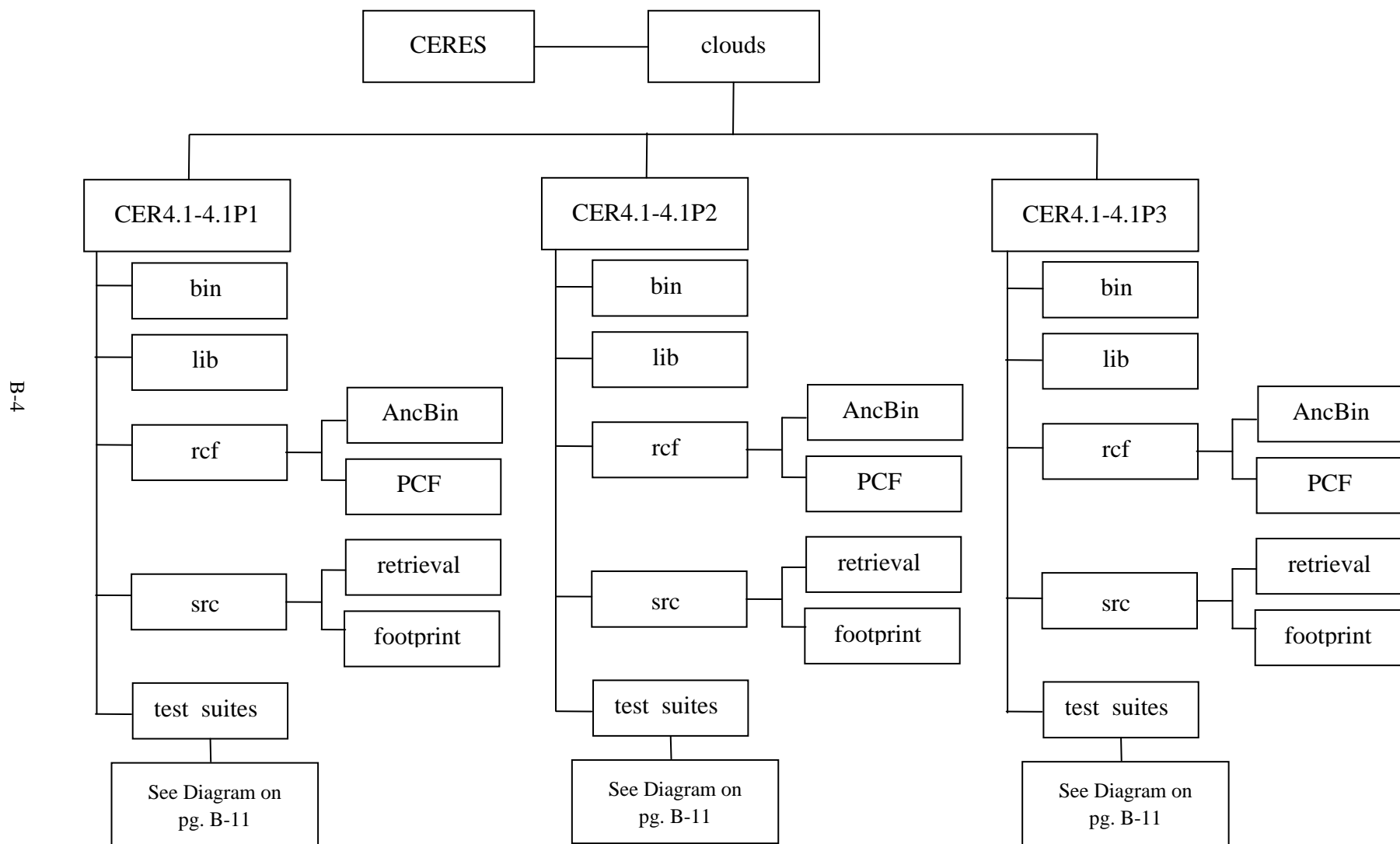


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

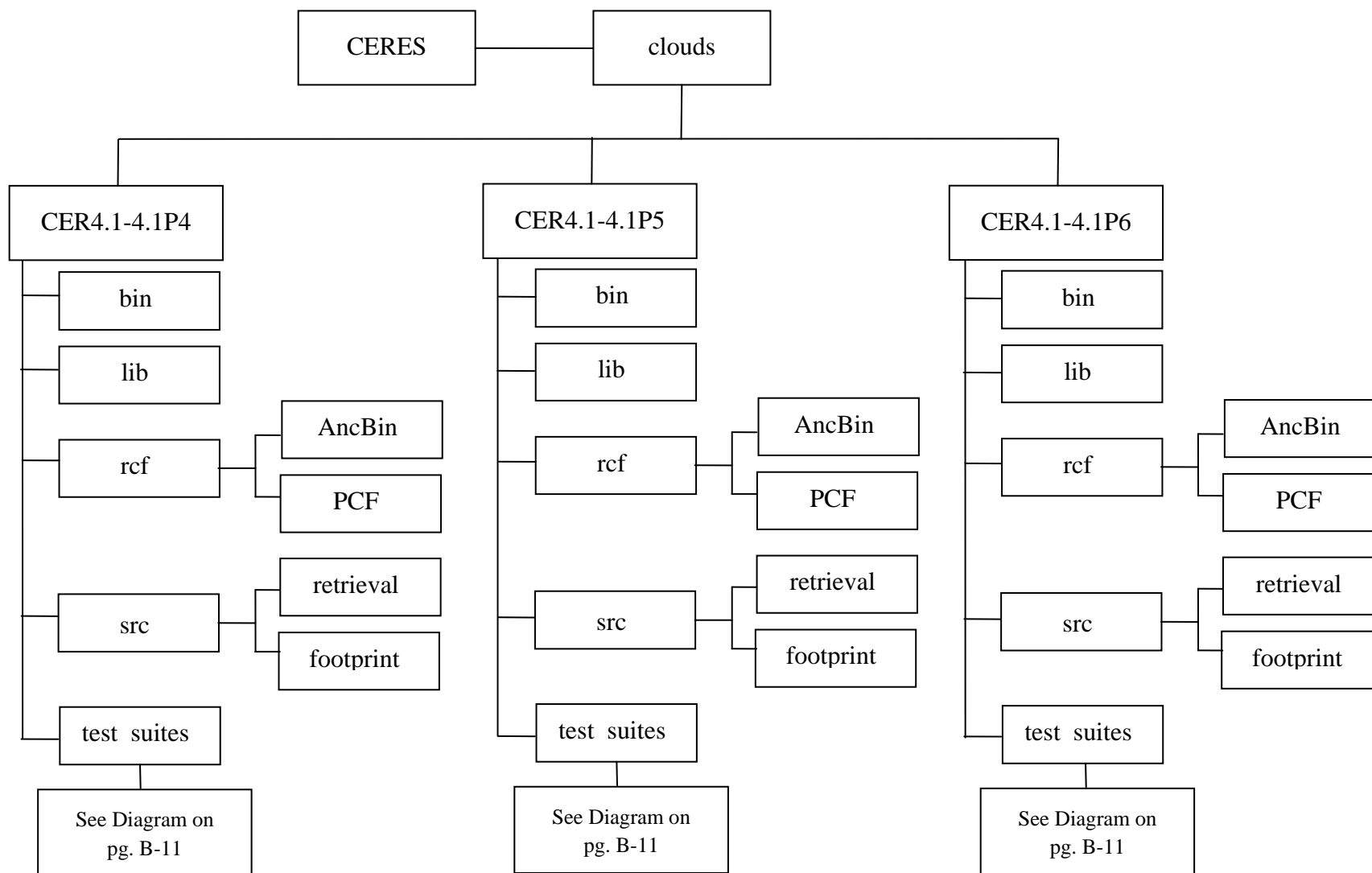


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems



## Directory Structure for the Cloud Retrieval and Convolution Tar File

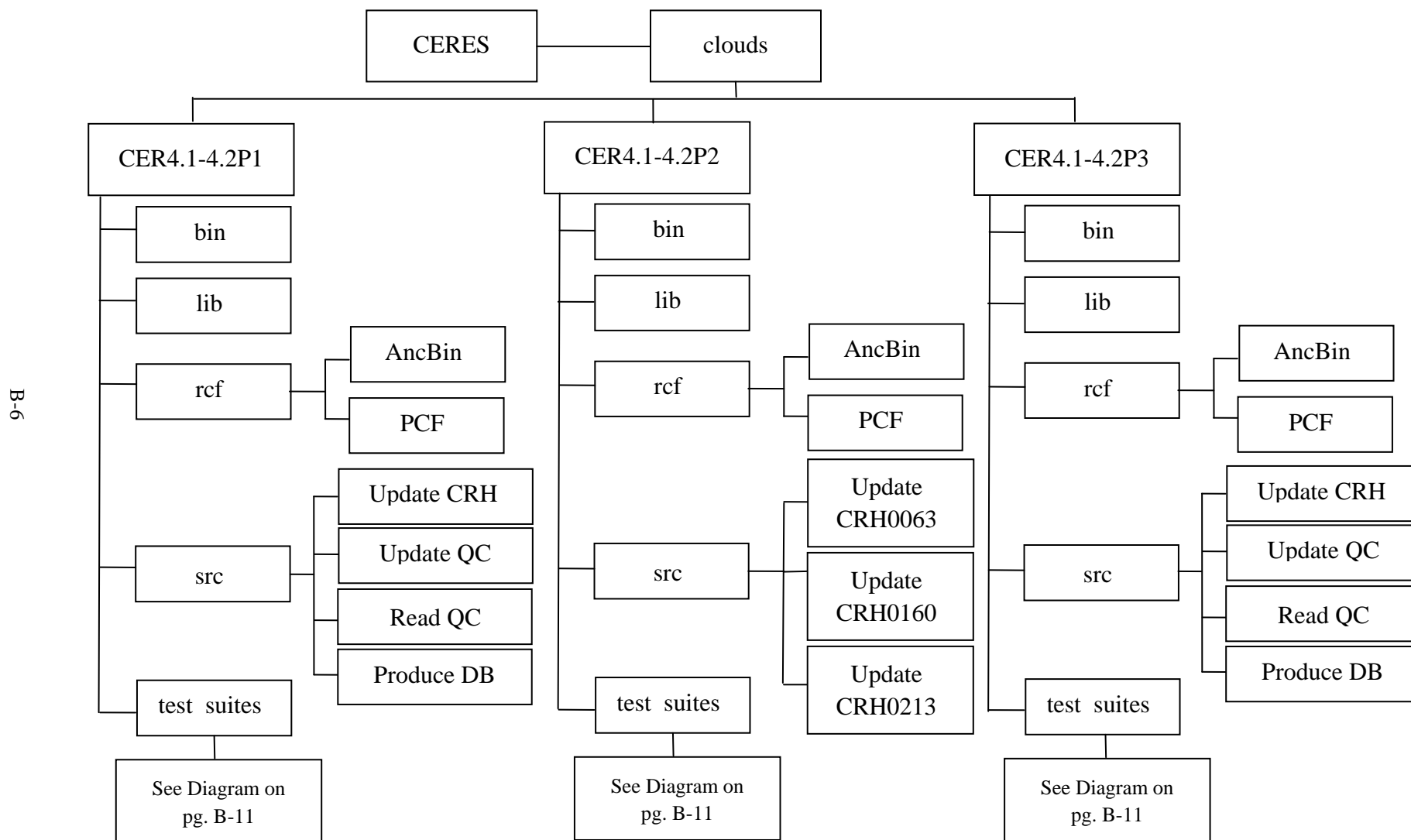


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

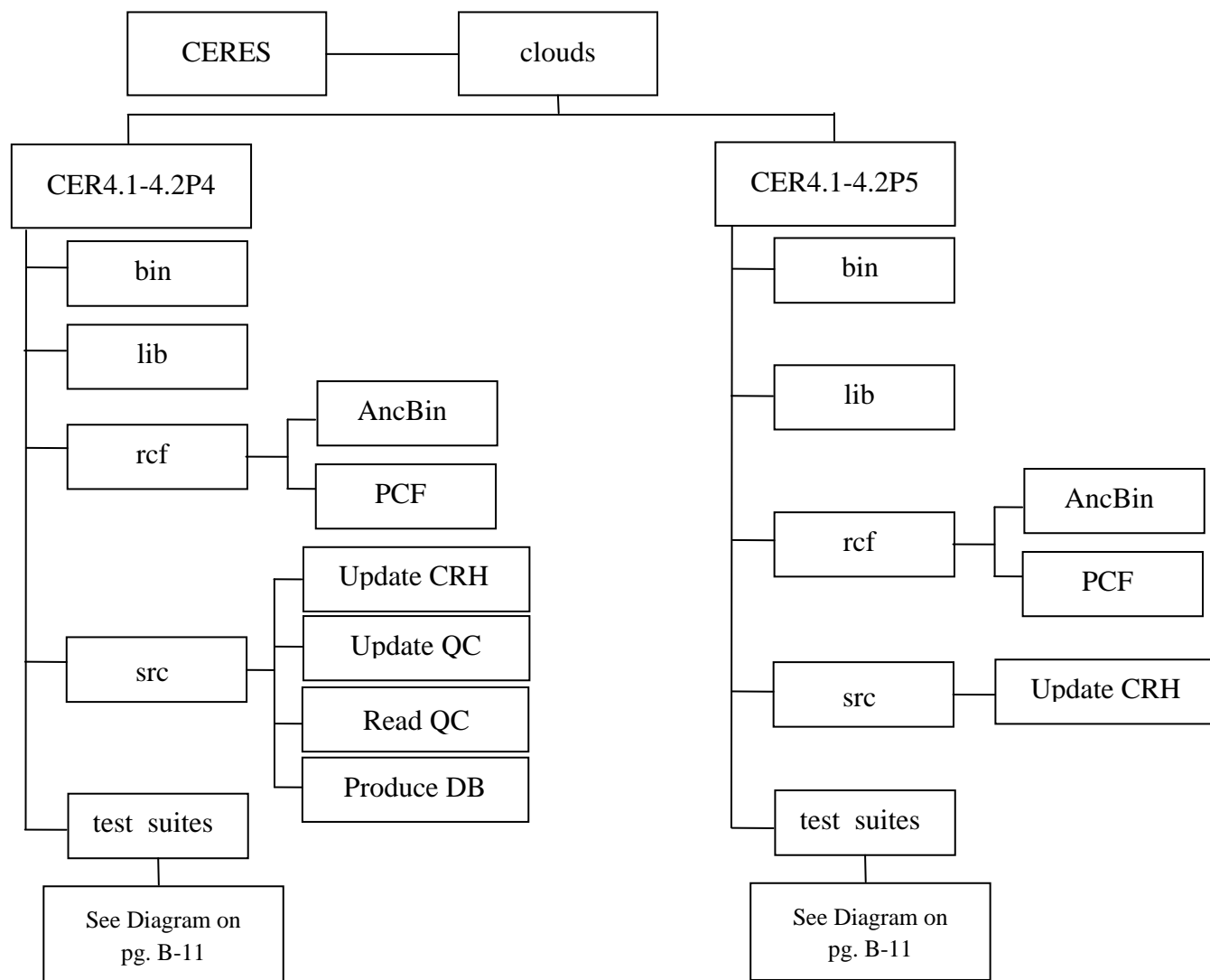


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

# Directory Structure for the Cloud Retrieval and Convolution Tar File

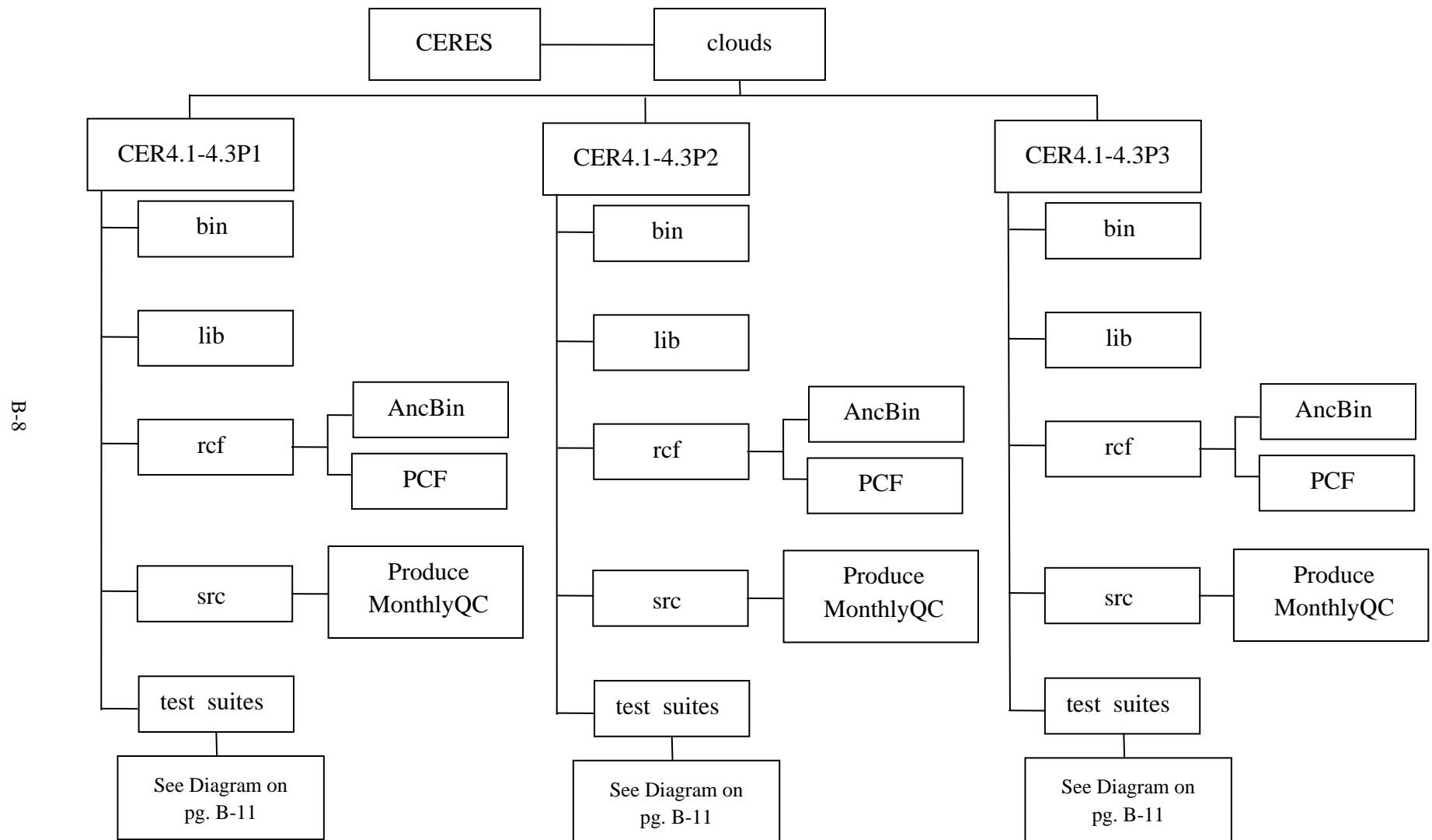


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

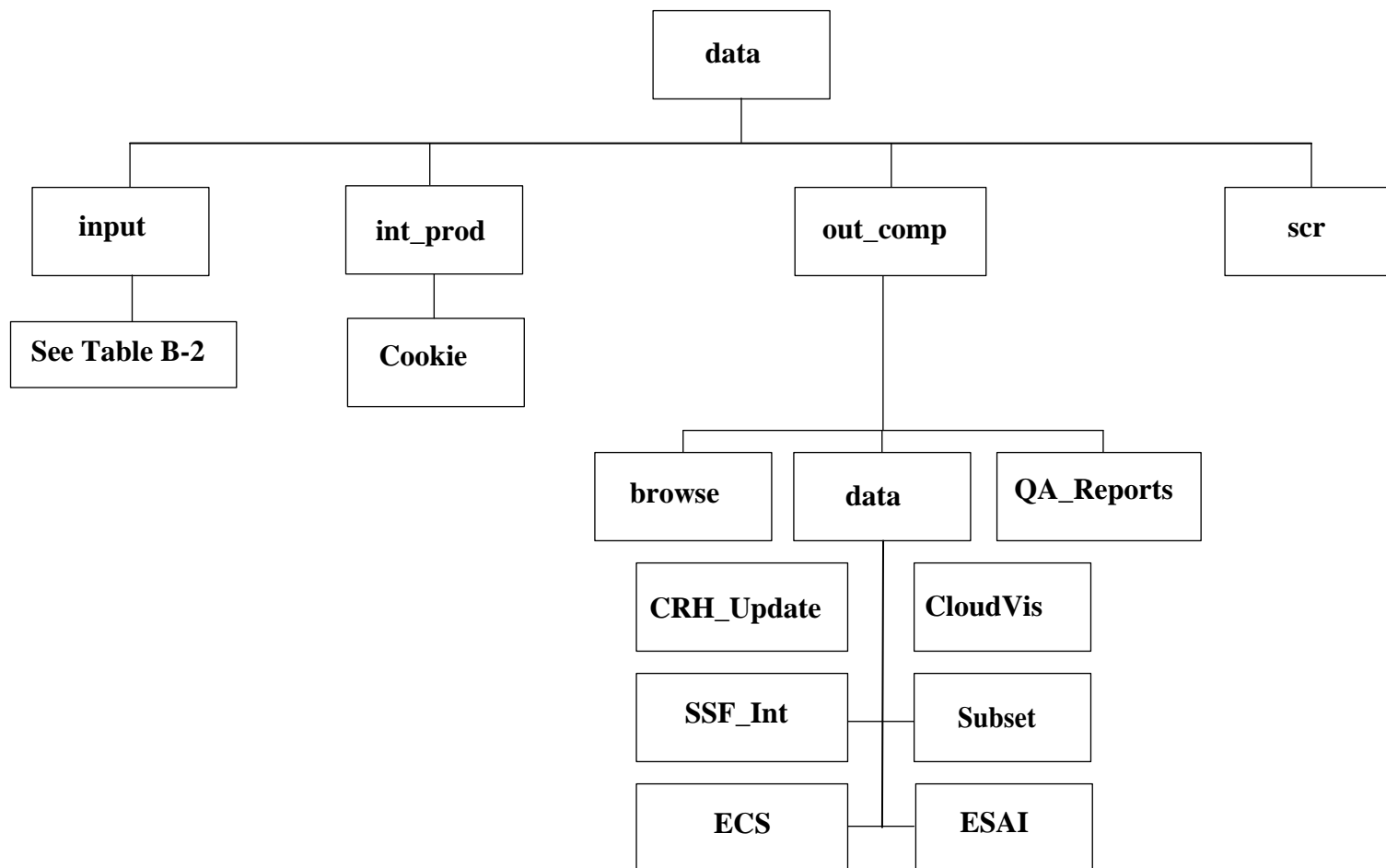


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

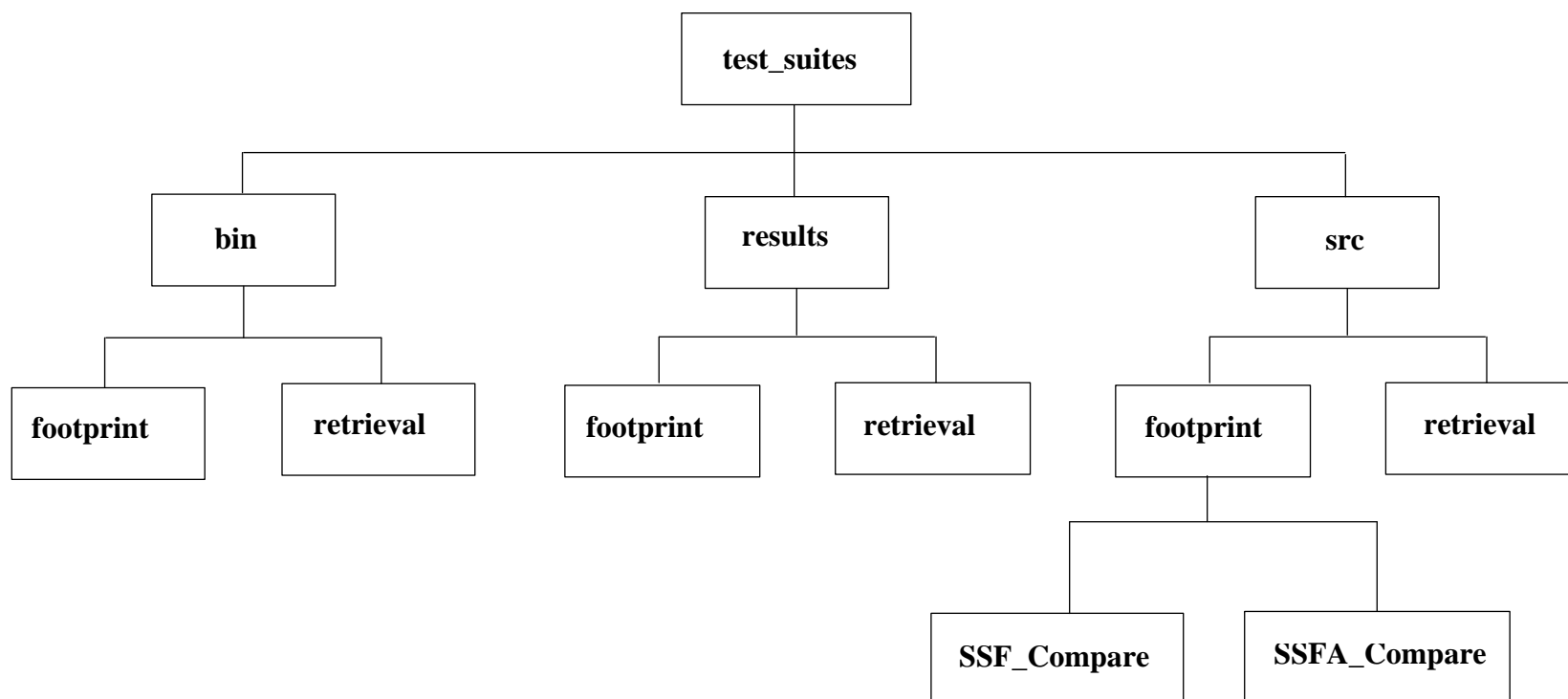


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

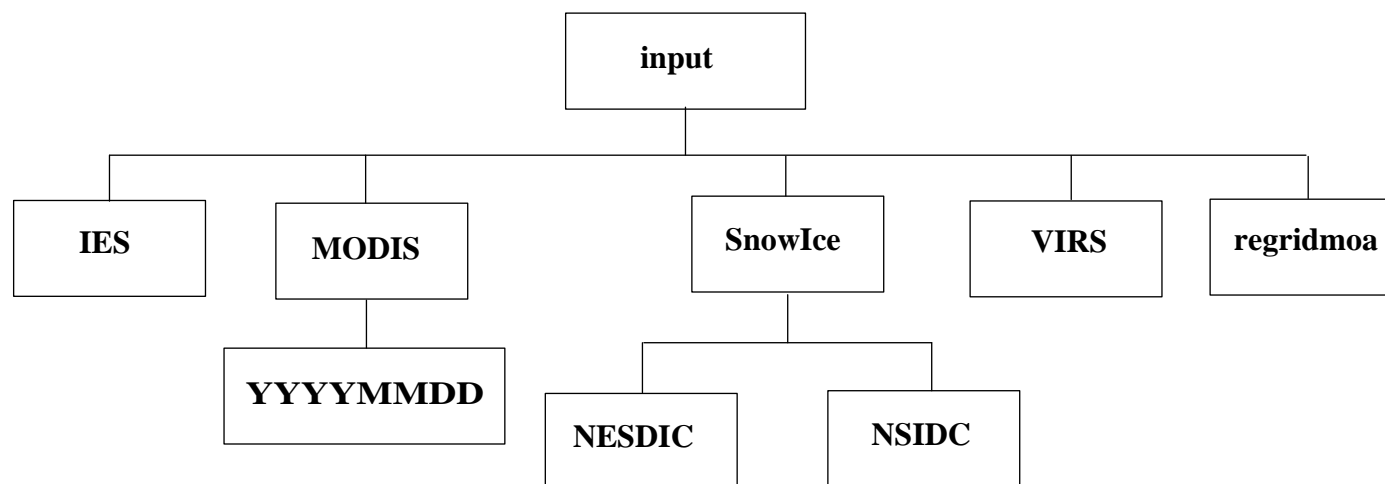


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

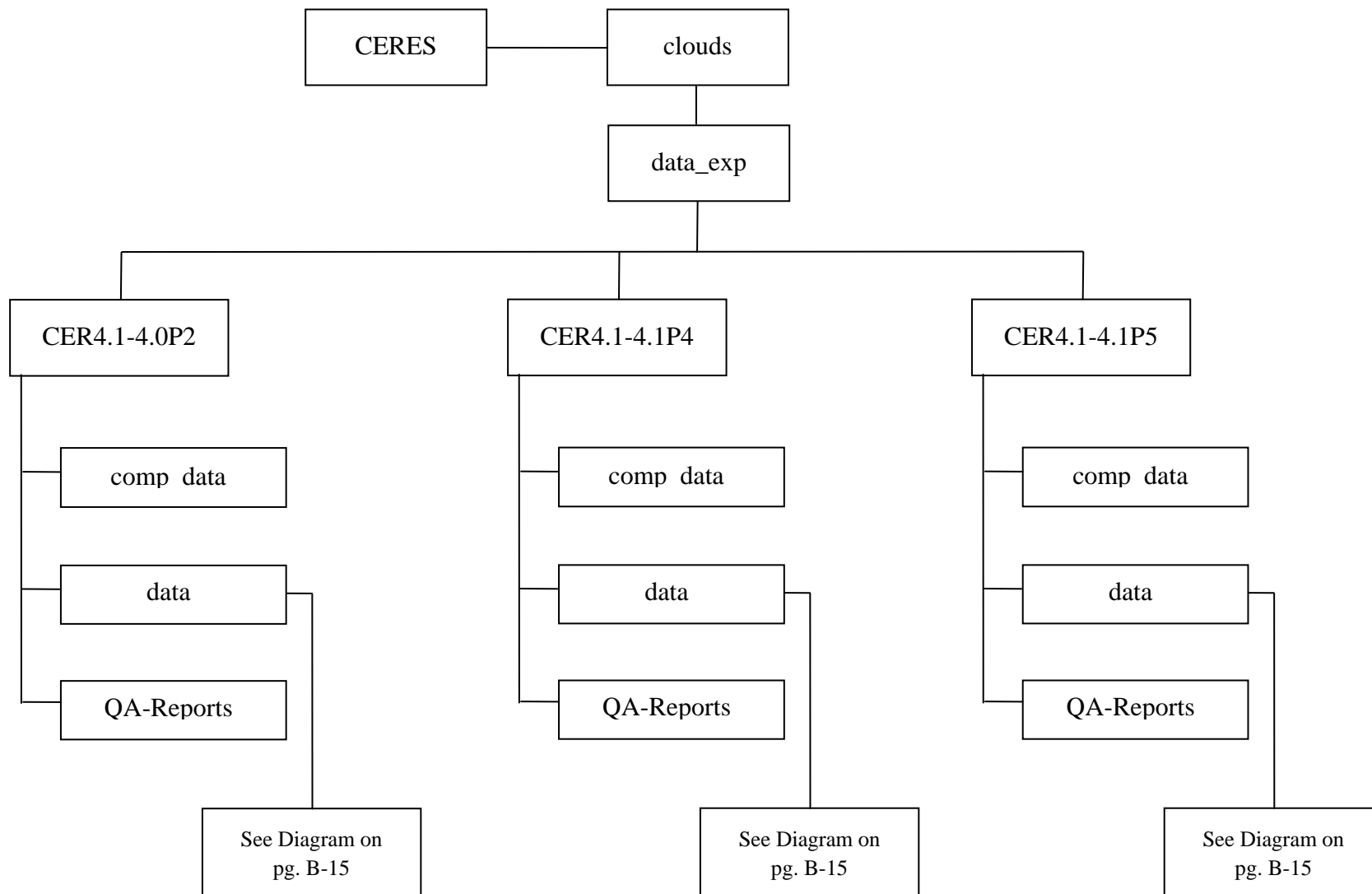


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Directory Structure for the Cloud Retrieval and Convolution Tar File

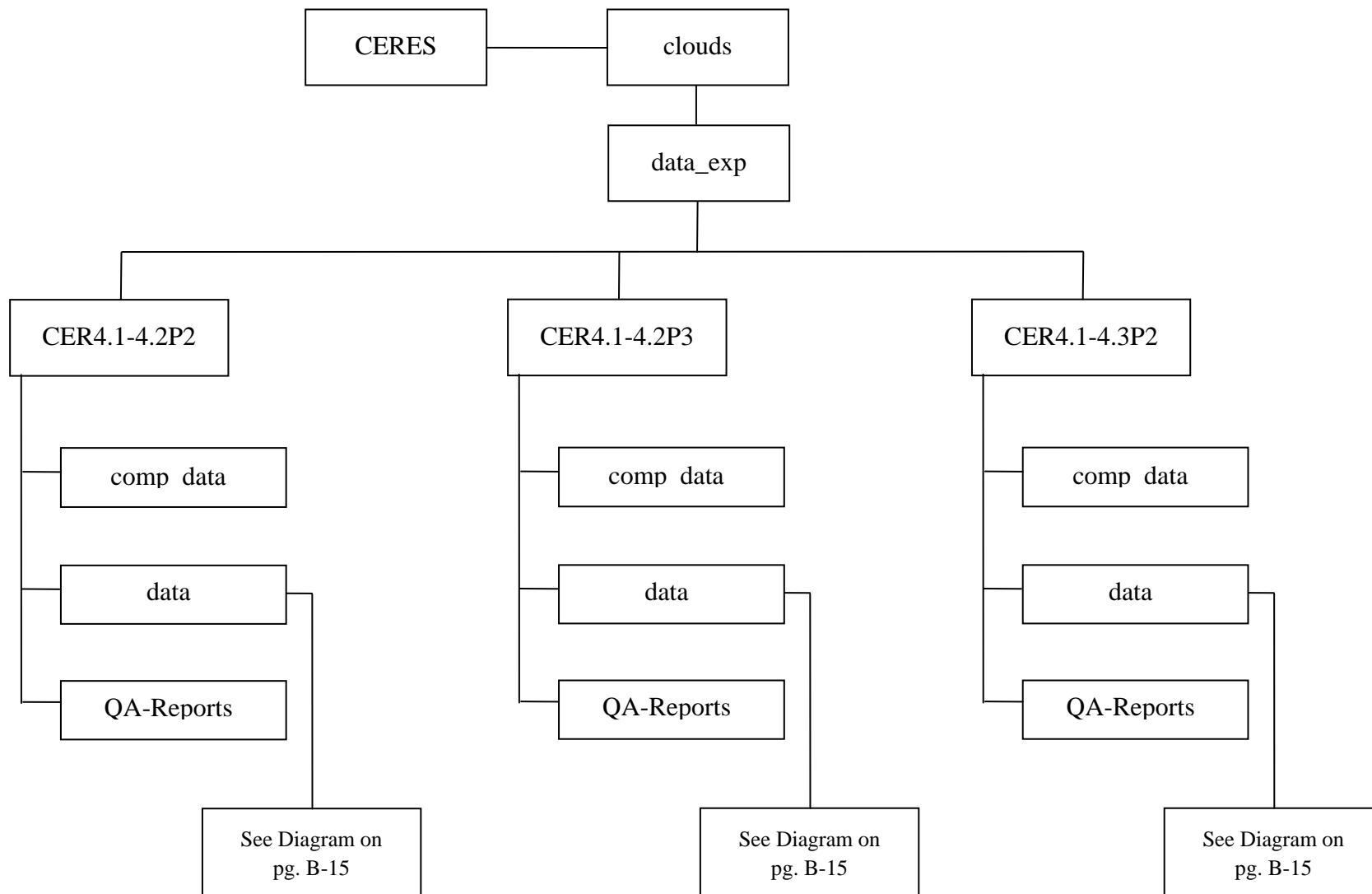


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems



## Directory Structure for the Cloud Retrieval and Convolution Tar File

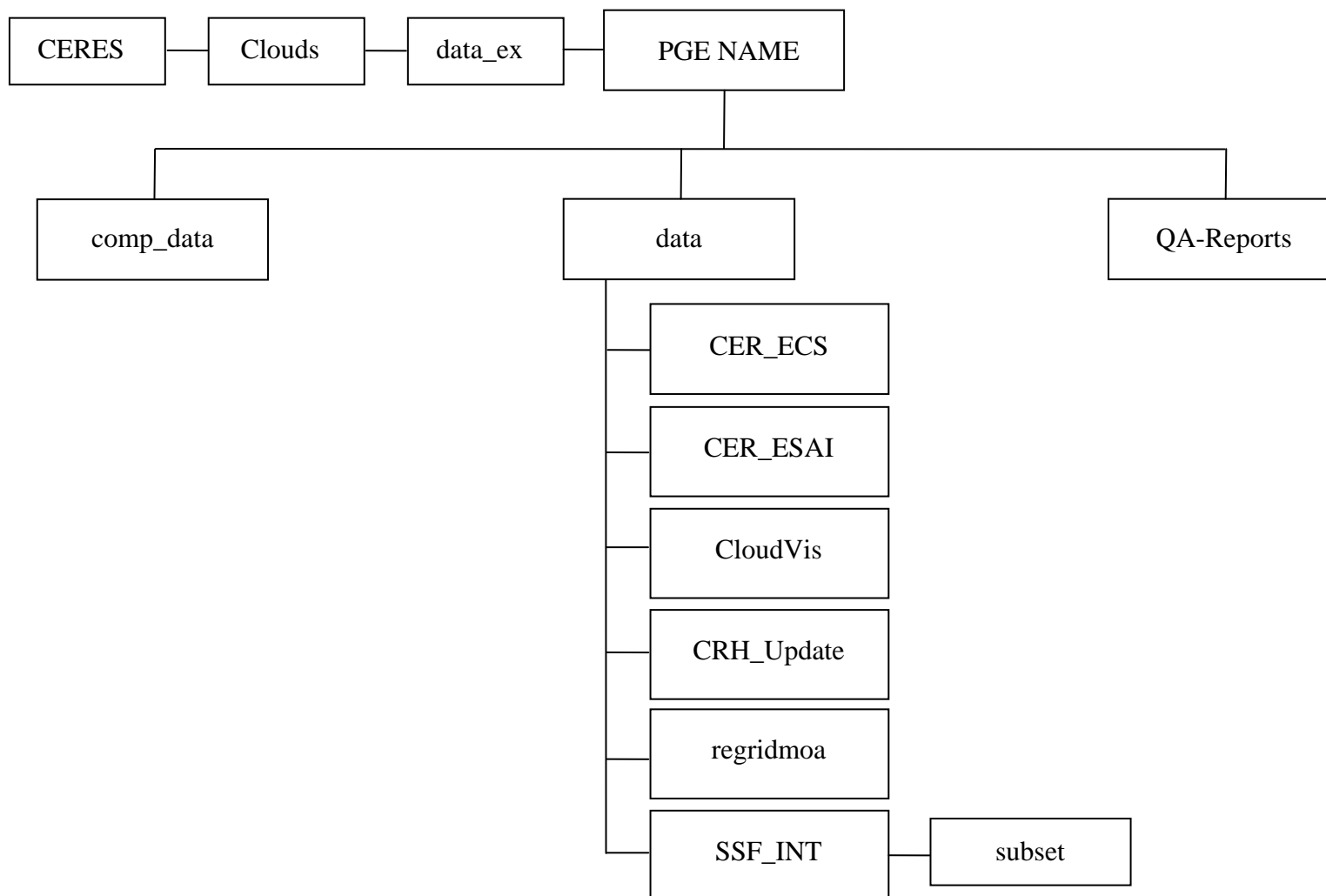


Figure B-1. Directory Structure for the Clouds and Convolution Subsystems

## Appendix C

### File Description Tables

#### C.1 Production Scripts

Table C.1-1. Production Scripts

| File Name                   | Format | Description                                     |
|-----------------------------|--------|---|
| CER4.1-4.PCFGen             | ASCII  | Generic C-Shell script for PCF generation       |
| CER4.1-4.PCFGen.pl          | ASCII  | Generic PERL script for PCF generation          |
| CER4.1-4.Tokens             | ASCII  | Generic C-Shell script for PCF generation       |
| CER4.1-4.Tokens.pl          | ASCII  | Generic PERL script for PCF generation          |
| CER4.1-4.env                | ASCII  | Generic C-Shell script for PCF generation       |
| Run.CER4.1-4.Cleanup        | ASCII  | Generic C-Shell cleanup script                  |
| Run.CER4.1-4.Cleanup.pl     | ASCII  | Generic PERL cleanup script                     |
| Run.CER4.1-4.MailSummary    | ASCII  | Generic C-Shell mail script                     |
| Run.CER4.1-4.MailSummary.pl | ASCII  | Generic PERL mail script                        |
| CER4.1-4.0P1.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P1.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P2.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P3.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P4.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P5.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P6.PCFGen.pl      | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.2P1.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P2.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P3.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P4.PCFGen.pl      | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.2P5.PCFGen.pl      | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.3P1.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.3P2.PCFGen         | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.3P3.PCFGen.pl      | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.0P1.PCFGen.IFile   | ASCII  | C-Shell script to generate the ASCII input file |

Table C.1-1. Production Scripts

| File Name                     | Format | Description                                     |
|-------------------------------|--------|---|
| CER4.1-4.1P1.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.1P2.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.1P3.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.1P4.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.1P5.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.1P6.PCFGGen.IFile.pl | ASCII  | PERL script to generate the ASCII input file    |
| CER4.1-4.2P1.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.2P2.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.2P3.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.2P4.PCFGGen.IFile.pl | ASCII  | PERL script to generate the ASCII input file    |
| CER4.1-4.2P5.PCFGGen.IFile.pl | ASCII  | PERL script to generate the ASCII input file    |
| CER4.1-4.3P1.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.3P2.PCFGGen.IFile    | ASCII  | C-Shell script to generate the ASCII input file |
| CER4.1-4.3P3.PCFGGen.IFile.pl | ASCII  | PERL script to generate the ASCII input file    |
| CER4.1-4.0P1.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P1.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P2.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P3.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P4.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P5.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.1P6.PCFGGen.OFile.pl | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.2P1.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P2.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P3.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.2P4.PCFGGen.OFile.pl | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.2P5.PCFGGen.OFile.pl | ASCII  | PERL script to generate PCFile for PGE          |
| CER4.1-4.3P1.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.3P2.PCFGGen.OFile    | ASCII  | C-Shell script to generate PCFile for PGE       |
| CER4.1-4.3P3.PCFGGen.OFile.pl | ASCII  | PERL script to generate PCFile for PGE          |

Table C.1-1. Production Scripts

| File Name                     | Format | Description   |
|-------------------------------|--------|---|
| Run.CER4.1-4.0P1              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.0P1.RenameMonth  | ASCII  | C-Shell script for running part of PGE CER4.1-4.0P1 |
| Run.CER4.1-4.0P1.RenameVIRS   | ASCII  | C-Shell script for running part of PGE CER4.1-4.0P1 |
| Run.CER4.1-4.0P1.SnowIce      | ASCII  | C-Shell script for running part of PGE CER4.1-4.0P1 |
| Run.CER4.1-4.0P1.SubsetMonth  | ASCII  | C-Shell script for running part of PGE CER4.1-4.0P1 |
| Run.CER4.1-4.1P1              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.1P1.retrieval    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P1 |
| Run.CER4.1-4.1P1.footprint    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P1 |
| Run.CER4.1-4.1P2              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.1P2.retrieval    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P2 |
| Run.CER4.1-4.1P2.footprint    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P2 |
| Run.CER4.1-4.1P3              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.1P3.retrieval    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P3 |
| Run.CER4.1-4.1P3.footprint    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P3 |
| Run.CER4.1-4.1P4              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.1P4.retrieval    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P4 |
| Run.CER4.1-4.1P4.footprint    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P4 |
| Run.CER4.1-4.1P5              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.1P5.retrieval    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P5 |
| Run.CER4.1-4.1P5.footprint    | ASCII  | C-Shell script for running part of PGE CER4.1-4.1P5 |
| Run.CER4.1-4.1P6.pl           | ASCII  | PERL script to run PGE                              |
| Run.CER4.1-4.1P6.retrieval.pl | ASCII  | PERL script for running part of PGE CER4.1-4.1P6    |
| Run.CER4.1-4.1P6.footprint.pl | ASCII  | PERL script for running part of PGE CER4.1-4.1P6    |
| Run.CER4.1-4.2P1              | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.2P1.DailyBinned  | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P1 |
| Run.CER4.1-4.2P1.SCOOL        | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P1 |
| Run.CER4.1-4.2P1.UpdateCRH    | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P1 |
| Run.CER4.1-4.2P1.UpdateQC     | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P1 |

Table C.1-1. Production Scripts

| File Name                         | Format | Description   |
|-----------------------------------|--------|---|
| Run.CER4.1-4.2P2                  | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.2P2.DailyBinned      | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P2 |
| Run.CER4.1-4.2P2.SCOOL            | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P2 |
| Run.CER4.1-4.2P2.UpdateCRH        | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P2 |
| Run.CER4.1-4.2P2.UpdateQC         | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P2 |
| Run.CER4.1-4.2P3                  | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.2P3.DailyBinned      | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P3 |
| Run.CER4.1-4.2P3.SCOOL            | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P3 |
| Run.CER4.1-4.2P3.UpdateCRH        | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P3 |
| Run.CER4.1-4.2P3.UpdateQC         | ASCII  | C-Shell script for running part of PGE CER4.1-4.2P3 |
| Run.CER4.1-4.2P4.pl               | ASCII  | PERL script to run PGE                              |
| Run.CER4.1-4.2P4.DailyBinned.pl   | ASCII  | PERL script for running part of PGE CER4.1-4.2P4    |
| Run.CER4.1-4.2P4.SCOOL.pl         | ASCII  | PERL script for running part of PGE CER4.1-4.2P4    |
| Run.CER4.1-4.2P4.UpdateQC.pl      | ASCII  | PERL script for running part of PGE CER4.1-4.2P4    |
| Run.CER4.1-4.2P5.pl               | ASCII  | PERL script to run PGE                              |
| Run.CER4.1-4.2P5.UpdateCRH0063.pl | ASCII  | PERL script for running part of PGE CER4.1-4.2P5    |
| Run.CER4.1-4.2P5.UpdateCRH0160.pl | ASCII  | PERL script for running part of PGE CER4.1-4.2P5    |
| Run.CER4.1-4.2P5.UpdateCRH0213.pl | ASCII  | PERL script for running part of PGE CER4.1-4.2P5    |
| Run.CER4.1-4.3P1                  | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.3P2                  | ASCII  | C-Shell script to run PGE                           |
| Run.CER4.1-4.3P3.pl               | ASCII  | PERL script to run PGE                              |

## C.2 Executables

Table C.2-1. Executables<sup>1</sup>

| File Name                        | Format | Description                        |
|----------------------------------|--------|------------------------------------|
| Exe.CER4.1-4.0P1.SnowIce         | Binary | Snow and Ice Processor executable  |
| Exe.CER4.1-4.0P1.RenameVIRS      | Binary | Renaming VIRS file executable      |
| Exe.CER4.1-4.1P1.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P1.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.1P2.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P2.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.1P3.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P3.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.1P4.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P4.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.1P5.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P5.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.1P6.retrieval       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.1P6.footprint       | Binary | Convolution executable             |
| Exe.CER4.1-4.2P1.DailyBinnedAqua | Binary | Daily Binned QC Report executable  |
| Exe.CER4.1-4.2P1.ReadQCAqua      | Binary | QC Read executable                 |
| Exe.CER4.1-4.2P1.UpdateCRH       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.2P1.UpdateQCAqua    | Binary | Daily QC File Generator executable |
| Exe.CER4.1-4.2P2.DailyBinned     | Binary | Daily Binned QC Report executable  |
| Exe.CER4.1-4.2P2.ReadQC          | Binary | QC Read executable                 |
| Exe.CER4.1-4.2P2.UpdateCRH       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.2P2.UpdateQC        | Binary | Daily QC File Generator executable |
| Exe.CER4.1-4.2P3.DailyBinnedAqua | Binary | Daily Binned QC Report executable  |
| Exe.CER4.1-4.2P3.ReadQCAqua      | Binary | QC Read executable                 |
| Exe.CER4.1-4.2P3.UpdateCRH       | Binary | Cloud Retrieval executable         |
| Exe.CER4.1-4.2P3.UpdateQCAqua    | Binary | Daily QC File Generator executable |

Table C.2-1. Executables<sup>1</sup>

| File Name                         | Format | Description                          |
|-----------------------------------|--------|--------------------------------------|
| Exe.CER4.1-4.2P4.DailyBinned      | Binary | Daily Binned QC Report executable    |
| Exe.CER4.1-4.2P4.ReadQC           | Binary | QC Read executable                   |
| Exe.CER4.1-4.2P4.UpdateQC         | Binary | Daily QC File Generator executable   |
| Exe.CER4.1-4.2P5.UpdateCRH0063    | Binary | Cloud Retrieval executable           |
| Exe.CER4.1-4.2P5.UpdateCRH0160    | Binary | Cloud Retrieval executable           |
| Exe.CER4.1-4.2P5.UpdateCRH0213    | Binary | Cloud Retrieval executable           |
| Exe.CER4.1-4.3P1.ProduceMonthlyQC | Binary | Monthly QC File Generator executable |
| Exe.CER4.1-4.3P2.ProduceMonthlyQC | Binary | Monthly QC File Generator executable |
| Exe.CER4.1-4.3P3.ProduceMonthlyQC | Binary | Monthly QC File Generator executable |

1. These files will be generated on execution of Subsystem software and are not included in the tar file.

### C.3 Status Message Files (SMF)

Table C.3-1. Status Message Files

| File Name       | Format | Description                                 |
|-----------------|--------|---|
| CERES_25450     | ASCII  | Status Message File for Subsystem 4.1 - 4.3 |
| CERES_25460     | ASCII  | Status Message File for Subsystem 4.1 - 4.3 |
| FOOTPRINT_25500 | ASCII  | Status Message File for Subsystem 4.4       |

### C.4 Processing Control Files (PCF) and Metadata Control Files (MCF)

The Process Control Files are not included in the Software Delivery Package. They will be created by the PCF generator scripts.

Table C.4-1. Metadata Control Files

| File Name    | Format | Description                   |
|--------------|--------|-------------------------------|
| CECRHUAC.MCF | ODL    | MCF for Update CRH files      |
| CECRH_AC.MCF | ODL    | MCF for CRH files             |
| CECVS_AC.MCF | ODL    | MCF For Subset CloudVis files |
| CECV__AC.MCF | ODL    | MCF For CloudVis files        |
| CEICE_AC.MCF | ODL    | MCF For Ice Map               |

Table C.4-1. Metadata Control Files

| File Name    | Format | Description                                      |
|--------------|--------|--|
| CEIPD_AC.MCF | ODL    | MCF For Cookiedough files                        |
| CEQCB_AC.MCF | ODL    | MCF for Cloud Retrieval Binary QC files          |
| CEQCS_AC.MCF | ODL    | MCF for Cloud Retrieval S'COOL files             |
| CEQCDVAC.MCF | ODL    | MCF for Cloud Retrieval Daily binned QC files    |
| CEQCD_AC.MCF | ODL    | MCF for Cloud Retrieval Daily QC files           |
| CEQCMBAC.MCF | ODL    | MCF for Cloud Retrieval Monthly binned QC files  |
| CEQCMGAC.MCF | ODL    | MCF for Cloud Retrieval Monthly gridded QC files |
| CEQCV_AC.MCF | ODL    | MCF for Cloud Retrieval binned QC files          |
| CESNOWAC.MCF | ODL    | MCF For Snow Map                                 |
| CFQCI_AB.MCF | ODL    | MCF for Convolution ASCII QC Report              |
| CFQC__AB.MCF | ODL    | MCF for Convolution Binary QC Report             |
| CFSSFIAB.MCF | ODL    | MCF File for Intermediate SSF                    |
| CFSSFAAB.MCF | ODL    | MCF for the Intermediate SSFA                    |

Table C.4-2. Process Control Files<sup>1</sup>

| File Name   | Format | Description   |
|---|--------|---|
| CER4.1-4.0P1_PCF_CERES_NSIDC_000000.19980105                  | ASCII  | Process Control File template for Snow and Ice Processor  |
| CER4.1-4.0P1_PCFin_CERES_NSIDC_000000.19980105                | ASCII  | ASCII file created by the ASCII file generator to be used by the Snow and Ice Processor's PCF generator       |
| CER4.1-4.1P1_PCF_TRMM-PFM-VIRS_SSIT_000000.1998010516         | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P1_PCFin_TRMM-PFM-VIRS_SSIT_000000.1998010516       | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator               |
| CER4.1-4.1P1_PCF_TRMM-PFM-VIRS_SubsetSSIT_000000.1998010516   | ASCII  | Process Control File template for Main Processor (Subset Mode)  |
| CER4.1-4.1P1_PCFin_TRMM-PFM-VIRS_SubsetSSIT_000000.1998010516 | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator (Subset Mode) |



Table C.4-2. Process Control Files<sup>1</sup>

| File Name   | Format | Description   |
|---|--------|---|
| CER4.1-4.1P1_PCF_Terra-FM1+FM2_MODIS_SSIT_000000.2000062316         | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P1_PCFin_Terra-FM1+FM2_MODIS_SSIT_000000.2000062316       | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P1_PCF_Terra-FM1+FM2_MODIS_SubsetSSIT_000000.2000062316   | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P1_PCFin_Terra-FM1+FM2_MODIS_SubsetSSIT_000000.2000062316 | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P2_PCF_Terra-FM1+FM2_MODIS_SSIT_000000.2000062316         | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P2_PCFin_Terra-FM1+FM2_MODIS_SSIT_000000.2000062316       | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P3_PCF_Aqua-FM3+FM4_MODIS_SSIT_000000.2000062316          | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P3_PCFin_Aqua-FM3+FM4_MODIS_SSIT_000000.2000062316        | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P4_PCF_Terra-FM1+FM2_MODIS_V005_000000.2005060717         | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P4_PCFin_Terra-FM1+FM2_MODIS_V005_000000.2005060717       | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P5_PCF_Aqua-FM3+FM4_MODIS_V005_000000.2005060717          | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P5_PCFin_Aqua-FM3+FM4_MODIS_V005_000000.2005060717        | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator |
| CER4.1-4.1P6_PCF_Aqua-FM3+FM4-MODIS_SSIT_000000.2006071519          | ASCII  | Process Control File template for Main Processor  |

Table C.4-2. Process Control Files<sup>1</sup>

| File Name   | Format | Description   |
|---|--------|---|
| CER4.1-4.1P6_PCFin_Aqua-FM3+FM4-MODIS_SSIT_000000.2006071519  | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator             |
| CER4.1-4.1P6_PCF_Terra-FM1+FM2-MODIS_SSIT_000000.2006071517   | ASCII  | Process Control File template for Main Processor  |
| CER4.1-4.1P6_PCFin_Terra-FM1+FM2-MODIS_SSIT_000000.2006071517 | ASCII  | ASCII file created by the ASCII file generator to be used by the Main Processor's PCF generator             |
| CER4.1-4.2P1_PCF_TRMM-PFM-VIRS_SSIT_000000.19980105           | ASCII  | Process Control File template for Clear Sky Update Processor  |
| CER4.1-4.2P1_PCFin_TRMM-PFM-VIRS_SSIT_000000.19980105         | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.2P2_PCF_TRMM-PFM-VIRS_SSIT_000000.19980105           | ASCII  | Process Control File template for Clear Sky Update Processor  |
| CER4.1-4.2P2_PCFin_TRMM-PFM-VIRS_SSIT_000000.19980105         | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.2P3_PCF_Aqua-MODIS_V005_000000.20050607              | ASCII  | Process Control File template for Clear Sky Update Processor  |
| CER4.1-4.2P3_PCFin_Aqua-MODIS_V005_000000.20050607            | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.2P3_PCF_Terra-MODIS_V005_000000.20050607             | ASCII  | Process Control File template for Clear Sky Update Processor  |
| CER4.1-4.2P3_PCFin_Terra-MODIS_V005_000000.20050607           | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.2P4_PCF_Aqua-MODIS_SSIT_000000.20060715              | ASCII  | Process Control File template for Daily QC Processor  |
| CER4.1-4.2P4_PCFin_Aqua-MODIS_SSIT_000000.20060715            | ASCII  | ASCII file created by the ASCII file generator to be used by the Daily QC Processor's PCF generator         |
| CER4.1-4.2P4_PCF_Terra-MODIS_SSIT_000000.20060715             | ASCII  | Process Control File template for Daily QC Processor  |

Table C.4-2. Process Control Files<sup>1</sup>

| File Name   | Format | Description   |
|---|--------|---|
| CER4.1-4.2P4_PCFin_Terra-MODIS_SSIT_000000.20060715 | ASCII  | ASCII file created by the ASCII file generator to be used by the Daily QC Processor's PCF generator         |
| CER4.1-4.2P5_PCF_Aqua-MODIS_SSIT_000000.20060715    | ASCII  | Process Control File template for ClearSky Update Processor   |
| CER4.1-4.2P5_PCFin_Aqua-MODIS_SSIT_000000.20060715  | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.2P5_PCF_Terra-MODIS_SSIT_000000.20060715   | ASCII  | Process Control File template for ClearSky Update Processor   |
| CER4.1-4.2P5_PCFin_Terra-MODIS_SSIT_000000.20060715 | ASCII  | ASCII file created by the ASCII file generator to be used by the Clear Sky Update Processor's PCF generator |
| CER4.1-4.3P3_PCF_Aqua-MODIS_SSIT_000000.200607      | ASCII  | Process Control File template for Monthly QC Processor  |
| CER4.1-4.3P3_PCFin_Aqua-MODIS_SSIT_000000.200607    | ASCII  | ASCII file created by the ASCII file generator to be used by the Monthly QC Processor's PCF generator       |
| CER4.1-4.3P3_PCF_Terra-MODIS_SSIT_000000.200607     | ASCII  | Process Control File template for Monthly QC Processor  |
| CER4.1-4.#P3_PCFin_Terra-MODIS_SSIT_000000.200607   | ASCII  | ASCII file created by the ASCII file generator to be used by the Monthly QC Processor's PCF generator       |

1. These files will be generated on execution of Subsystem software and are not included in the tar file.

## C.5 HDF Read Software

There is no HDF read software associated with the delivered PGEs.

## C.6 Ancillary Input Data

Table C.6-1. Ancillary Input Data

| File Name  | Format | Description  |
|--|--------|--|
| BDM/CER_EAI_BDM0063_015000.epoch                             | Binary | Bi-directional Model, 0.63                                       |
| BDM/CER_EAI_BDM0160_015000.epoch                             | Binary | Bi-directional Model, 1.6  |
| BDM/CER_EAI_DM0063_<SAT>-<IMAG>_015000.epoch                 | Binary | Directional Model, 0.63 micron                                   |
| BDM/CER_EAI_DM0160_<SAT>-<IMAG>_015000.epoch                 | Binary | Directional Model, 1.6 micron                                    |
| BDM/CER_EAI_DM1663_<SAT>-<IMAG>_015000.epoch                 | Binary | Ratio Directional Model, 1.6/0.63                                |
| BDM/CER_EAI_TOAREFALBSIMM0063_015000.epoch                   | Binary | Snow and Ice Reflectance Model for 0.6um summer                  |
| BDM/CER_EAI_TOAREFALBSIMM0160S_015000.epoch                  | Binary | Snow and Ice Reflectance Model for 1.6um for summer              |
| BDM/CER_EAI_TOAREFALBSIMM0160W_015000.epoch                  | Binary | Snow and Ice Reflectance Model for 1.6um for winter              |
| BDM/CER_EAI_TOAREFALBSIMM0375S_015000.epoch                  | Binary | Snow and Ice Reflectance Model for 3.75um for summer             |
| BDM/CER_EAI_TOAREFALBSIMM0375W_015000.epoch                  | Binary | Snow and Ice Reflectance Model for 3.75um for winter             |
| footprint/CER_FPARAM_CERES_<CC>.epoch <sup>1</sup>           | ASCII  | Science inputs for footprint control                             |
| footprint/CER_FPSF_<SAT><INST><IMAG>.<CC>.epoch <sup>1</sup> | ASCII  | CERES point spread function for satellite/instrument/ and imager |
| footprint/CER_FDBin_<SAT>-<INST>-<IMAG>_000000.epoch         | ASCII  | File listing footprints to print                                 |
| footprint/CER_FAOT063_CERES_<CC>.epoch <sup>1</sup>          | Binary | Stowe third generation 0.63 Look-up Table                        |
| footprint/CER_FAOT160_CERES_<CC>.epoch <sup>1</sup>          | Binary | Stowe third generation 1.60 Look-up Table                        |
| Tables/CER_EICF_<SAT>-<IMAG>_014000.epoch                    | ASCII  | Imager Coefficients  |
| Tables/CER_EICF_<SAT>-<IMAG>_014000.epoch                    | ASCII  | Calibration File   |
| Tables/CER_EIEASE_CERES_00003.epoch                          | Binary | File for polar stereographic to cartesian coordinates            |
| Tables/CER_EPARAM_<IMAG>.epoch                               | ASCII  | Science inputs for retrieval control                             |
| Tables/CER_EPCParamMap_015000.epoch                          | ASCII  | Logical IDs for PCF generation                                   |

Table C.6-1. Ancillary Input Data

| File Name  | Format | Description  |
|--|--------|--|
| Tables/CER_ESCF_Stowe-0063_015000.epoch                | Binary | Stowe 0.63 LUT   |
| Tables/CER_ESCF_Stowe-0160_015000.epoch                | Binary | Stowe 1.6 LUT  |
| Tables/CER_ESCF_CERESThres_015000.epoch                | ASCII  | CERES Cloud Mask Thresholds                            |
| Tables/CER_ESCF_ChiThrTable_015000.epoch               | ASCII  | CERES Chi Thresholds                                   |
| Tables/CER_ESCF_SubsetRegions_015000.epoch             | ASCII  | Subset CloudVis Regions                                |
| SCOOL/CER_ESCF_SCOOLRegions_011000.YYYYMM <sup>2</sup> | ASCII  | SCOOL Participant Locations for year YYYY and month MM |
| Vint/CER_EDM_<IMAG>.epoch                              | Binary | VINT Algorithm Input File                              |
| Vint/ERBEBDMreformatted.dat                            | ASCII  | VINT Algorithm Input File                              |
| Vint/LNPWderiv.ch4.allvz.dy.dat                        | Binary | VINT Algorithm Input File                              |
| Vint/SkinTderiv.ch4.allvz.dy.dat                       | Binary | VINT Algorithm Input File                              |
| Vint/bdnnref.dat                                       | Binary | VINT Algorithm Input File                              |
| Vint/channel2.coefs                                    | Binary | VINT Algorithm Input File                              |
| Vint/channel3.coefs                                    | Binary | VINT Algorithm Input File                              |
| Vint/channel4.coefs                                    | Binary | VINT Algorithm Input File                              |
| Vint/channel5.coefs                                    | Binary | VINT Algorithm Input File                              |
| Vint/dxalbmean.dat                                     | ASCII  | VINT Algorithm Input File                              |
| Vint/modelsnew.3.7.dat                                 | Binary | VINT Algorithm Input File                              |
| Vint/modelsnew.dat                                     | Binary | VINT Algorithm Input File                              |
| Vint/ratios1_6.dat                                     | Binary | VINT Algorithm Input File                              |
| Vint/raybref.dat                                       | Binary | VINT Algorithm Input File                              |
| Vint/table-invcl                                       | ASCII  | VINT Algorithm Input File                              |
| Vint/virs.corrk.coefs.1.interval                       | Binary | VINT Algorithm Input File                              |
| Vint/virs.corrk.coefs.5.intervals                      | ASCII  | VINT Algorithm Input File                              |
| Vint/CER_ECOEFS_<IMAG>_CORRK.epoch                     | ASCII  | VINT Algorithm Input File                              |
| Vint/all_dif_coefs                                     | ASCII  | VINT Algorithm Input File                              |
| Vint/CER_EMODEL_<IMAG>_0375.epoch                      | ASCII  | VINT Algorithm Input File                              |
| Vint/nmodels.1.6.dat                                   | ASCII  | VINT Algorithm Input File                              |
| Vint/virsdir   | ASCII  | VINT Algorithm Input File                              |

Table C.6-1. Ancillary Input Data

| File Name  | Format | Description  |
|--|--------|--|
| CO2/modisbnd.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CO2/modisdry.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CO2/modisozo.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CO2/modiswco.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CO2/modiswtl.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CO2/modiswts.am1   | Binary | CO2 Slicing Algorithm input file                                   |
| CER_ECS/CER_ECS-SOA0063m_<SAT>-<IMAG>_StartUp_015000.XXXXMM <sup>3</sup> | Binary | Start-up CRH map for Albedo 0.63 mean                              |
| CER_ECS/CER_ECS-SOA0063s_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Albedo 0.63 std                               |
| CER_ECS/CER_ECS-SOA0160m_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Albedo 1.60 mean                              |
| CER_ECS/CER_ECS-SOA0160s_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Albedo 1.60 std                               |
| CER_ECS/CER_ECS-SOA1663m_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Albedo 1.6:0.63 ratio mean                    |
| CER_ECS/CER_ECS-SOA1663s_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Albedo 1.6:0.63 ratio Std                     |
| CER_ECS/CER_ECS-SBT1080m_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Brightness Temperature 10.8 mean              |
| CER_ECS/CER_ECS-SBT1080s_015000.XXXXMM <sup>3</sup>                      | Binary | Start-up CRH map for Brightness Temperature 10.8 std               |
| CER_EDI/CER_EDiCorrm_<MOA_SRC>_015000.XXXXMM <sup>3</sup>                | Binary | Diurnal correction model for MOA product. Dependent on MOA source. |
| CER_EDI/CER_EDiCorrs_<MOA_SRC>_015000.XXXXMM <sup>3</sup>                | Binary | Diurnal correction model for MOA product. Dependent on MOA source. |
| CER_EANC/CER_EH2O_CERES_00003.epoch                                      | Binary | Percent Water Coverage   |
| CER_EANC/CER_EIGBP_CERES_011000.epoch                                    | Binary | IGPB Ecosystem Map   |
| CER_EANC/CER_ELEV_CERES_00003.epoch                                      | Binary | Surface Elevation Map  |
| CER_EANC/CER_ETERR_CERES_00003.epoch                                     | Binary | Terrain Characteristic Map   |
| CER_EANC/CER_EMOAF_CERES_011000.epoch                                    | Binary | MOA Water Flag   |
| CER_EANC/CER_EMOAS_CERES_000004.epoch                                    | Binary | MOA Scene Type   |
| CER_EANC/CER_EMOAW_<MOA_SRC>_015000.                                     | Binary | MOA Water Percentage   |

Table C.6-1. Ancillary Input Data

| File Name   | Format | Description                  |
|---|--------|------------------------------|
| epoch   |        |                              |
| CER_FANC/CER_FREFL_CERES_000005.epoch               | ASCII  | Reflect Algorithm Input File |
| CER_EANC/CER_WELCHMASK_<IMAG>_015000.epoch          | Binary | Welch Algorithm Input File   |
| CER_EANC/CER_WELCHTERR_015000.epoch                 | Binary | Welch Algorithm Input File   |
| CER_EANC/CER_WELCHMASK_Old19Chan_MODIS_015000.epoch | Binary | Welch Algorithm Input File   |
| CER_EM/CER_EM0375_CERES_010000.XXXXMM <sup>3</sup>  | Binary | Emissivity Map Channel 3.75  |
| CER_EM/CER_EM1080_CERES_010000.XXXXMM <sup>3</sup>  | Binary | Emissivity Map Channel 10.80 |
| CER_EM/CER_EM1190_CERES_010000.XXXXMM <sup>3</sup>  | Binary | Emissivity Map Channel 11.90 |

1. CC represents Configuration Code.
2. YYYYMM represents a specific year and month combination between 199801 and 199906.
3. XXXXMM represents a specific month without dependency on the year.

## C.7 Output Temporary Data Files (Production Results)

Table C.7-1. Output Temporary Data Files<sup>1</sup>

| File Name  | Format | Description   |
|--|--------|---|
| CER_IPD_TRMM-VIRS_SSIT_000000.1998010516                       | Binary | Imager data file containing pixel-level cloud property data |
| CER_IPD_TRMM-VIRS_SSIT_000000.1998010516.met                   | ODL    | Metadata load file for imager data file                     |
| CER4.1-4.1P1_MCFScr_TRMM-PFM-VIRS_SSIT_000000.1998010516       | ASCII  | Toolkit generated file used in reading metadata             |
| CER_IPD_TRMM-VIRS_SubsetSSIT_000000.1998010516                 | Binary | Imager data file containing pixel-level cloud property data |
| CER_IPD_TRMM-VIRS_SubsetSSIT_000000.1998010516.met             | ODL    | Metadata load file for imager data file                     |
| CER4.1-4.1P1_MCFScr_TRMM-PFM-VIRS_SubsetSSIT_000000.1998010516 | ASCII  | Toolkit generated file used in reading metadata             |
| CER_IPD_Terra-MODIS_SSIT_000000.2000062316                     | Binary | Imager data file containing pixel-level cloud property data |
| CER_IPD_Terra-MODIS_SSIT_000000.2000062316.met                 | ODL    | Metadata load file for imager data file                     |

Table C.7-1. Output Temporary Data Files<sup>1</sup>

| File Name  | Format          | Description   |
|--|-----------------|---|
| CER4.1-4.1P1_MCFScr_Terra-FM1+FM2-MODIS_SSIT_000000.2000062316       | ASCII           | Toolkit generated file used in reading metadata             |
| CER4.1-4.1P2_MCFScr_Terra-FM1+FM2-MODIS_SSIT_000000.2000062316       | ASCII           | Toolkit generated file used in reading metadata             |
| CER4.1-4.1P3_MCFScr_Aqua-FM3+FM4-MODIS_SSIT_000000.2000062316        | ASCII           | Toolkit generated file used in reading metadata             |
| CER_IPD_Terra-MODIS_SubsetSSIT_000000.2000062316                     | Binary          | Imager data file containing pixel-level cloud property data |
| CER_IPD_Terra-MODIS_SubsetSSIT_000000.2000062316.met                 | ODL             | Metadata load file for imager data file                     |
| CER4.1-4.1P1_MCFScr_Terra-FM1+FM2-MODIS_SubsetSSIT_000000.2000062316 | ASCII           | Toolkit generated file used in reading metadata             |
| MCFWrite.temp  | ASCII           | Toolkit generated file used in writing metadata             |
| pcxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx <sup>2</sup>                      | Binary or ASCII | Toolkit generated work file                                 |

1. These files will be generated on execution of Subsystem software and are not included in the tar file.
2. A 30-digit random number is generated by Toolkit to append after pc in naming its temporary files.



## **Appendix D**

### **Evaluation of Comparison Software Output**

There are four phases run during the execution of the Comparison Software. The progress of the program is shown on the screen during execution and should resemble:

**Validating Data Products for <PGE>**

.

**Validating Metadata Files for <PGE>**

.

**Validating Support Files for <PGE>**

.

**Validating Log Files for <PGE>**

.

Where <PGE> is the PGE being validated and the “.” indicates a series of files evaluated during that phase. Data Products and Metadata files are those products produced by the subsystem. Support files are the PCF and its internal file. Log files are the Toolkit generated files. For each successful comparison, a message is issued:

**Level <N> Comparison Successful for <FILE>**

where “Level <N>” indicates the first level of test which yielded a successful result and “<FILE>” is the file compared. The levels you may see are:

Level 1: A flat binary compare between the generated and expected outputs was successful.

Level 2: An ASCII file, such as a log file, cannot successfully pass a binary compare. A successful Level 2 comparison means that certain strings, such as date, time, and OS specific fields, have been removed from both the generated and expected outputs and the results successfully compared.

Level 3: This level of comparison is provided for those support files, like the PCF, that may contain temporary file names generated by the Toolkit. This level of comparison removes the temporary file names from the generated and expected outputs.

Level 4: This level of comparison is used only to execute the software developed to compare Interim SSFs.

Level 5: This level of comparison is used to execute software developed to compare supposedly identical HDF files.